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Honorable John A. Marsh Jr.
Secretary of the Army

Richard K. Tierney
Editor

Cover: **A UH-60 (left) and an AH-64 combine to create an image of the Air Cavalry Attack Brigade symbol (the official symbol is at the left). These helicopters and the ACAB symbol are representative of the latest in Army Aviation equipment and organization. But, equipment and organization alone cannot be effective components of the Army's combat arms team without an accompanying development of innovative tactics and training programs. In this respect, General William R. Richardson offers some sage advice to those of us in Army Aviation in his article beginning on page 2**

The mission of the ***U.S. Army Aviation Digest (USPS 415-350)*** is to provide information of an operational, functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine and other related data.

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Articles, photos and items of interest on Army Aviation are invited. Direct communication is authorized to: Editor, ***U.S. Army Aviation Digest,*** P.O. Drawer P, Fort Rucker, AL 36362. Manuscripts returned upon request.

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FAMILIARITY AND overconfidence can sometimes breed complacency. For instance, we in the community know that Army Aviation as a combat arm is an essential part of the Army combined arms team, so we assume everyone else does also. Unfortunately, such is not always the case. Some startling evidence to support that contention is presented in this issue's lead article by Lieutenant General William R. Richardson, former deputy commanding general, TRADOC, and commanding general, Army Combined Arms Center, Fort Leavenworth, KS, and currently, the Deputy Chief of Staff for Operations and Plans, Headquarters, Department of the Army.

In "Airmobility in the 1980s," General Richardson reports on a student-conducted survey at the Command and General Staff College "to determine what the future 'employers' of airmobile assets think about Army Aviation's viability and practical application in future warfare." The responses included the fact that about one-third of the students surveyed "admitted to knowing little, if anything, about the employment of airmobile assets on the battlefield"! The exclamation mark is mine because this is a very disturbing revelation to me, as I am sure it is to you.

Certainly it would also be our consensus that some action must be taken to overcome this critical deficiency of tactical knowledge among our fellow Soldiers. General Richardson cogently advises us as to measures that we should take to ensure that Army Aviation is not only fully accepted as a vital member of the combined arms team, but is also fully integrated into the AirLand Battle. Don't skip a word of this material. I believe it will help us understand that in addition to being "above-the-best" aviators, we must also be top-notch sales representatives! For if we as aviators do not understand the application of our product and "sell" it to those with whom we work, how will they be able to understand it and apply it?

Chief Warrant Officer, CW3, Carl D. Everhart and Dr. Michael G. Sanders have written "Aviation Warrant Officer Retention: An Overview." This is the first of four articles the *Digest* will publish in the following months on an Aviation Center/Army Research Institute study project which identified many of the personnel and operational issues which contributed to an increased attrition of aviation warrant officers from the active force in the 1974 to 1977 timeframe. The project enlisted the support of six members of the Warrant Officer Senior Course and yielded some very meaningful results which were then passed to MILPERCEN and DA DCSPER with specific recommendations for enhancing warrant officer career management and retention. Many of these initiatives have already been pursued and warrant officer aviator retention has been greatly enhanced as a direct result of this study project. This is a must for reading for all aviators, especially our warrant officers, and illustrates how corrective actions can be taken once the facts are properly presented to the Army's leadership.

Another most informative inclusion in this issue which really hits home is "NBC Training and Development" by Major Phillip H. Webb Jr. and Captain Timothy B. Savage. It is an accepted fact that the nuclear, biological, chemical threat will be very real in tomorrow's battles; and there is a definite need for aviation personnel to know how to deal with this eventuality. All too often we give lip service to a need and fail to train toward the "too hard" problems. NBC is an area in which we must train more and become better prepared. Some units are doing it, but all must be conscious of the requirement lest we be caught unprepared or unawares.

Finally, I call your attention to the outside back cover which spotlights the Army Chief of Staff's campaign to increase the efficient use of our Army's resources. The Chief of Staff has personally initiated the program and it deserves our total and unqualified support at every level, from crewchief to major commander. We all have a part to play. The wise use of resources means a better state of readiness for all our forces. Of necessity and by our very nature, aviation is an expensive resource; but our battlefield contribution in every function of land combat fully justifies that investment. We must earn our way and, in so doing, seek out ways to do even more with less—thus, becoming a more efficient, more effective element of the combined arms team. Your ideas on means to accomplish this important job are solicited. Your thoughts applied Armywide could amount to significant savings—savings that can then be applied to enhance our effectiveness and readiness.

Major General Carl H. McNair Jr.
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AIRMOBILITY IN THE 1980s

Lieutenant General William R. Richardson
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THE ARMY OF the 1980s is confronted with the most formidable challenge in its history. The massive buildup of Warsaw Pact forces during the past decade, coupled with a demonstrated willingness to use those forces to project power and influence, poses a threat of unparalleled magnitude to the security of our nation. Though this threat in Europe is the most dangerous to our national security, it is not the most likely war in which we may have to fight. Contingency operations in Southwest Asia or in Northeast Asia are far more likely to occur. The Army must be prepared to wage war, as directed by national command authority, in any of these scenarios and we must have appropriate doctrine and training to employ *all* the components of the combined arms team in the most effective manner. Army Aviation is

*General Richardson commanded the U.S. Army Combined Arms Center, Ft. Leavenworth, KS when he wrote this article

an important and currently underemployed component, and I would like to review the opportunities for Army Aviation in modern combined arms operations.

Until the end of the Vietnam War, Army Aviation had a superb history of applied ingenuity and dynamic development of doctrine, first entering combat in November 1942 when three Piper L-4 Cubs flew from the deck of the *USS Ranger* to observe artillery fire during the invasion of North Africa. In April 1962 the Secretary of Defense directed a reexamination of the role of Army Aviation. This benchmark decision in airmobility history created the U.S. Army Tactical Mobility Requirements Board under Lieutenant General Hamilton H. Howze which in turn resulted in the 11th Air Assault Division (T). The objectives and activities associated with the history of both have been well-documented in Lieutenant General Harry W. O. Kinnard's article "Airmobility Revisited" published in the June and July 1980 ***Aviation Digest.***

The airmobility challenge to the Army in the 1960s was one of tremendous magnitude, since we had very little in the way of approved doctrine, tactics, proven hardware systems and methods of operations. The Army, however, was equal to the task and rapidly closed ranks to develop, validate and train in the new concept. It was a concerted team effort which actively involved the branch schools and many units in the field. When airmobility was finally employed on a large scale in Vietnam, the concept's feasibility was confirmed for counterguerrilla and, to a limited degree, mid-intensity war.

The early 1970s marked the beginning of an eclipse of the influence of Army Aviation caused by two events: the withdrawal of the final American units from Vietnam and the Yom Kippur War.

That 1973 war was the most recent war in which well-equipped, heavy combat forces have fought on a modern battlefield. The lessons learned were costly to both sides and the U.S. Army revised its doctrine in response to these lessons. The newly organized Training and Doctrine Command (TRADOC) properly sought to turn the Army's attention away from its decade of concentration on guerilla warfare and toward the most dangerous threat to national security: war on the central plains of Europe.

The how-to-fight manuals, beginning with FM 100-5, "Operations," revitalized our doctrine and focused it almost exclusively on a European scenario. During this time, aviation doctrine and practice generally became a subsidiary matter in combined arms warfare because many people were unconvinced of the utility and survivability of helicopters in high intensity war.

As a result of these trends, airmobility lost its preeminent position by the mid-1970s. Many lessons learned in Vietnam have been forgotten. As a consequence, American officers have little understanding of airmobility in its total context and consequently profess little faith in its ability to play a significant role on future battlefields. Many categorically dismiss much of our experience in Vietnam as invalid or outmoded.

A Command and General Staff College (CGSC) student recently conducted a random survey of 100 of his fellow classmates to determine what the future "employers" of airmobile assets think about Army Aviation's viability and practical application in future warfare. The questions were open-ended and purposely avoided orienting specifically on any region of the world, although most respondents related their answers exclusively to a North Atlantic Treaty Organization (NATO) battlefield. The responses to this survey were disturbing. Almost one-third of those surveyed admitted to knowing little, if anything, about the employment of airmobile assets on the battlefield. When asked what degree of confidence they have in the ability of an airmobile force to accomplish its missions and survive on the mid-intensity battlefield, one-third of the students indicated a belief that airmobile forces have little or no chance of doing so. Further, those who felt that airmobile operations in mid-intensity conflict are feasible overwhelmingly stated that such operations should be restricted to rear area type missions, with only a very few indicating that small unit operations forward of the forward line of own troops (FLOT) are practical.

These results may or may not accurately reflect the base of knowledge and opinion among our younger Army officers; however, I fear that a similar sentiment regarding airmobility extends also into the higher ranks of the officer corps.

The early 1980s have seen three events of significance to the Army which provide great opportunities for Army Aviation: the changing nature of the threat, the Army's reevaluation of basic operational doctrine and the program to modernize Army equipment.

In recent years, the world has grown even smaller and more dangerous. Soviet surrogates have been employed in a number of wars, and Third World nation states—whose economic and ideological

Army Aviation first enters combat as an L-4 Cub takes off from the *USS Ranger* during the invasion of North Africa in 1942

interests run counter to our own—have developed armed forces equipped with highly sophisticated weapons systems made possible by the sale of oil or other scarce natural resources. The United States, Western Europe and Japan now recognize all too well their dependence on foreign oil imports and they have seen oil used as a tool of international politics. The downfall of the Shah of Iran, the war between Iran and Iraq and the Soviet invasion of Afghanistan have made clear the instability within Southwest Asia, an area of vital interest to the United States and its allies.

At the same time as these events were occurring, the Army began to reevaluate its basic concept of combat operations as articulated in FM 100-5, the new edition of which will be published this year. Defensive doctrine needed better articulation to preclude an attrition oriented defense and the Army now focuses more on maneuver as an essential factor in war, particularly in the defense.

A third major development of paramount importance to the Army is the ongoing modernization program in which more than 40 major new systems will be provided to the Army in the field between now and 1985. In order to properly integrate these new systems, the Army 86 Studies were undertaken and new forces were designed. The Heavy Division 86, either armored or mechanized, was designed to fight and win against Warsaw Pact forces in high intensity war. The Infantry Division 86 was changed significantly to give it sufficient antitank power and tactical mobility to fight in the NATO arena as well as strategic deployability to permit its use in contingency operations elsewhere in the world. Both of these new division structures incorporate an air cavalry attack brigade.

Currently, the Aviation Center is conducting the Army Aviation Mission Area Analysis (AAMAA). This exhaustive study effort is examining all of the functions of land combat, to include the contribution of Army Aviation to the functions of the AirLand Battle. The study is using a "front-to-rear" approach beginning with the threat, as depicted below, and will identify the deficiencies (many of which this article highlights) and related solutions in Army Aviation doctrine, force structure, training and materiel.

What have all these trends meant? Great new opportunities for Army Aviation, provided that Army aviators get out in front and lead in the development of doctrine and procedures to bring airmobility to its full usefulness as a combined arms team member.

This is an exciting time for Army Aviation, equal or greater in importance than that which occurred two decades ago under the Howze Board. Army aviators must think, analyze and apply Army Aviation in various types of contingency operations, in the renewed approach to maneuver warfare, and in synergy with oncoming new equipment.

Army Aviation's basic mission is to use aviation units and aircraft whenever and however they improve our Army's ability to fight. Thus aviators must examine every function of land combat to determine aviation applications in warfare. How can aviation forces contribute to success in close combat, fire support, air defense, command and control, intelligence and electronic warfare, communications, combat support and combat service support? Technological capabilities of aviation equipment have improved tremendously since our combat actions in Vietnam—where can new doctrine exploit these capabilities?

I'll cover several areas of doctrinal voids just to get the aviation thinkers off to a "flying" start.

Fundamental to our defeating an attacker on any battlefield is the requirement to seize the initiative through offensive action. We must seek out and exploit every opportunity to do this using all the assets available, and Army Aviation will play a major role in this effort. This means employing aviation forces anywhere on the battlefield, to include across the FLOT when the opportunity is there to strike the enemy deep and disrupt, delay and destroy his forces. Army Aviation is uniquely suited to such operations. The speed, firepower and maneuverability of aviation forces give them a tremendous advantage over ground maneuver elements. Terrain, friendly force dispositions and the nature of the enemy's doctrine will create gaps between his attacking formations, leaving him vulnerable to offensive strikes against his flanks and rear. These opportunities will be fleeting in nature and involve an element of risk. They will require a rapid and violent response by a force able to capitalize on mobility and speed superior to that of the enemy's massed armored columns on the move; a force able to maneuver over and position itself on terrain which is restricted or prohibited to the enemy; a force that can do all of this while taking an acceptable risk in

As part of the combat arms team, UH-60 Black Hawk helicopters provide mobility needed by ground forces during a recent 101st Airborne Division (Air Assault) exercise

order to deliver a devastating blow to the enemy when and where he least expects it. Airmobile forces will give us a unique capability to do this but we must have the doctrine which supports such concepts and we must train to do it. The training is essential because bold offensive maneuver is not only a function of the men and machines available but also the state of mind of our commanders. They must be willing and able to aggressively seize those opportunities and they must be tactically skilled, as a result of a strong doctrinal base and thorough training, in the employment of all the resources available.

The alarming rate at which the Soviets are producing and employing a variety of helicopters is a matter of grave concern to us all. The potential threat posed by their attack helicopter to our forces has been recognized by the Army Aviation community for some time. However we are still without doctrine for helicopter air-to-air combat despite considerable study, experimentation and testing in this area over the past 11 years. As a result of this lack of doctrine we have no formal training program to prepare our aviators to counter the threat. I suspect that our procrastination can be traced to a reluctance to deal with the problem without a proven, highly effective weapon for air-to-air engagements. However, the realities of a "come as you are war" dictate that we must be prepared today to fight with the weapons available and use them to best advantage. We must move immediately and vigorously to correct this problem. Doctrine, tactics and training must be compatible with our current capabilities. We cannot accept a lack of doctrine in a particular area while awaiting the results of testing of competing weapons systems or the hoped-for eventual fielding of one we believe will perfectly meet our needs.

Suppression of enemy air defense (SEAD) is well recognized as a major requirement for successful combined arms operations on the modern battlefield. Its bearing on the outcome of airmobile operations, close air support and joint air attack team operations cannot be overstated. We have taken the initial steps, along with the Air Force, toward arriving at the doctrinal equation of effective SEAD. This problem is definitely in the joint arena, and much work remains to be done. From the standpoint of airmobile operations, I feel that certain of our helicopters will ultimately have to rely primarily on their own resources to suppress enemy air defense systems. The improved 2.75 inch rocket with the multipurpose submunition warhead holds great promise in this regard, and we should carefully consider its application in formulating our tactics and doctrine for this vital area.

We continue to ignore the lack of realistic doctrine for forward combat service support of attack helicopter and air cavalry units. This is a critical omission in regard to the resupply of Class III and V supplies and the positioning of forward arming and refuel points (FARPs) to avoid their detection. The only conclusion that can be drawn from existing "how-to-fight" manuals is that resupply of Class III and V for these units will be accomplished using wheeled vehicles. This is an unworkable solution, as confirmed years ago by experience of the 11th Air Assault Division. The fast-paced, highly mobile and wide-ranging characteristics of attack helicopter and air cavalry operations demand flexible and responsive logistical support vehicles, i.e., other helicopters.

There are many other significant areas of interest to Army Aviation which need work including:

- Night operations for attack helicopters, air cavalry units and the joint air attack team.
- Tactical formations and battle drill for attack helicopters and air cavalry units.
- Employment of a helicopter mine-laying system.
- Airspace management.
- Control and distribution of fires (both direct

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AVIATION WARRANT OFFICER RETENTION

A MATTER OF CONCERN

CW3 Carl D. Everhart

and

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MONTHLY WRITING AWARD

THE UNITED STATES Army Research Institute has recently completed its investigation of aviation warrant officer retention. We at the Army Research Institute, Ft. Rucker Field Unit, would like to provide you with some direct feedback. This is the first of four articles in which we will attempt to answer some of your questions regarding AWO retention and, at the same time, enlighten you with some of the facts and results of the study.

Who Started The Project? In October 1979, the Chief, Warrant Officer Division, Military Personnel Center, sent a letter to ARI requesting research assistance. The letter documented a sizable decrease in second-tour retention for AWOs who had completed flight training in fiscal year 1976. MILPERCEN was concerned that the increased separation rate might:

- Indicate the presence of an aviator retention problem already troubling the other services.
- Signal the onset of a trend that would significantly increase Army Aviation training costs and reduce

Glossary

ARI	Army Research Institute
AWO	aviation warrant officer
DA	Department of the Army
EUSA	Eighth U.S. Army
FORSCOM	U.S. Army Forces Command
FY	fiscal year
MACOM	major Army command
MILPERCEN	Military Personnel Center
MOS	military occupational specialty
TRADOC	U.S. Army Training and Doctrine Command
USAREUR	U.S. Army, Europe
WESTCOM	Western Command

the combat effectiveness of Army Aviation units.

Why Was ARI Involved? MILPERCEN asked us for research assistance because, since 1974, the Ft. Rucker Field Unit has had within its mission the requirement to: (1) provide training research, human resources research, and technical advisory support to the Army Aviation community worldwide through direct participation with the Aviation Center, (2) execute an advanced development research program in support of the Aviation Center and Army Aviation, and (3) develop a technology-based program of research to provide future benefits to Army Aviation. ARI is an activity operating under the Deputy Chief of Staff for Personnel, Headquarters, Department of the Army.

Hasn't AWO Retention Been Studied Before? During our initial investigation we found that many studies had been conducted concerning the structure of the Warrant Officer Corps; however, few efforts were specifically related to *retention* issues. Some of the more recent studies did provide a starting point that helped us identify some of the basic issues regarding the retention problem.

What Was The AWO Retention Rate? In the first quarter of FY 1980, MILPERCEN's preliminary figures on retention indicated that AWOs were leaving the Army at a higher rate than had been observed in the past. A close look at the records revealed that AWOs who completed their flight school training during FY 1973, 1974 and 1975 had about a 65 percent retention rate at the end of their 3-year obligated tour. Those warrant officers who completed training during FY 1976, 1977T and 1977 had about a 45 percent retention rate at the end of their obligated tours. This trend represented about a 20 percent drop in retention between FY 1975 and FY 1976 and contributed to the annual voluntary separation of about 500 AWOs. This figure plus 100 AWOs who were being medically grounded and another 100 retiring equaled around 700 AWOs lost each year.

This high separation/attrition rate was of great concern for three primary reasons:

- aviator replacement training costs
- increasing force structure needs
- limitations in the number of aviators that are programed to be trained each year.

It costs more than $125,000 to train each aviator in the Initial Entry Rotary Wing Course. This figure does not include the costs associated with the 3 to 4 years of on-the-job training required to refine and maintain proficiency in skills acquired during the aviator's tour. Figure 1 depicts the AWO force structure requirements as projected by MILPERCEN at the beginning of FY 1980. DA increased the training rate to 808 AWOs per year to help close the gap; however, even this increase in aviators will not simultaneously offset the AWO losses and meet the future force structure needs.

What Was Our Plan? Our research goal was to identify factors associated with AWO attrition. Toward this goal, we asked two specific research questions: *First,* what were the demographics of warrant officers who were likely to attrite? Specifically, we wanted to develop a profile of their characteristics such as age, time in service and number of dependents. *Second,* what were the attitudes or considerations which influenced their decision to

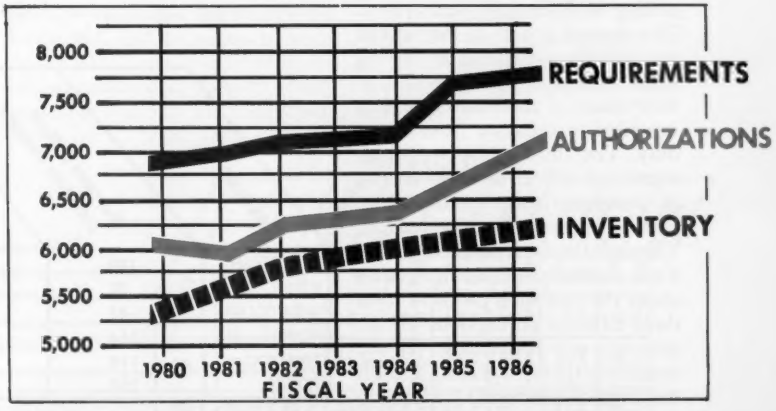

FIGURE 1: Aviation Warrant Officer Force Structure

separate from the Army? We carefully reviewed all of the information available on this topic, communicated with the Air Force and Navy about their approaches to aviator retention and completed many in-house analyses. The approach we selected involved collecting and analyzing data relevant to the two areas mentioned above through a survey questionnaire administered worldwide.

At the onset of this effort, the commanding general, MILPERCEN, asked all of the major commands for their opinions of the causes of the lowered retention rate. The results of our initial investigation along with feedback from the MACOMs provided the input for the development of a survey dealing with assignments, career intentions, separation decisions and demographic information.

Who Was Surveyed? We surveyed three different groups of aviators. First, a random sample of AWOs with social security numbers ending in 3, 6 or 8 participated. The second group to participate was AWOs identified as having given verbal or written notice to their chain of command that they intended to separate from active duty. The third group was commissioned officer aviators serving as company/troop commanders, platoon leaders or section leaders. Through these respondent groups it was possible to obtain information about the retention problem from three different perceptions: (1) the attritee's self-description, (2) the retainee's (peer) opinion, and (3) the chain of command's (supervisor) opinion. Questionnaires were completed by 757 AWOs in the random sample group, 141 AWOs who were planning to separate and 320 chain of command commissioned officers.

Where Were They Surveyed? We visited Army installations within the five MACOMs between September and December 1980: 14 in Germany (USAREUR), 8 in Korea (EUSA), 6 in the continental United States (FORSCOM and TRADOC), and 1 in Hawaii (WESTCOM). These commands contained about 95 percent of the operational AWOs. We chose these installations because of both their high density of aviators and their diversity in mission, command and geographic location (figure 2).

How Were They Surveyed? During the data collection visit to each installation, we gave the participants a standard briefing on the purpose of the visit, the nature of the project and general instructions for completing the survey. After they completed the survey, we interviewed some members of each group to ensure proper completion of the questionnaire and to aid us in the correct interpretation of the respondents' answers.

What Were The Results? We found a great deal of information about the attitudes and opinions that exist within the aviation community. In this article we provide an overview on our findings of the random sample group relative to: career intentions, location of the attritees, the attritees military occupational specialty, the source of entry, current career status and reasons for leaving. More information will be discussed in other articles of this series.

Career Intentions. Survey results showed that career intentions were related to rank (figure 3). AWOs indicated they would either get out or they were undecided but would probably get out as follows: 54.9 percent of the WO1s indicated they were in this category; 42.7 percent of the CW2s indicated they were in this category; 13.3 percent of the CW3s indicated they were in this category; and 3.8 percent of

MACOM	Warrant Officer (random sample)	Attritees (all available)	Chain of Command (commissioned officers)
USAREUR	199	18	105
EUSA	81	13	38
WESTCOM	47	14	24
FORSCOM	314	83	123
TRADOC	116	13	30
TOTAL	757	141	320

FIGURE 2: Survey Results

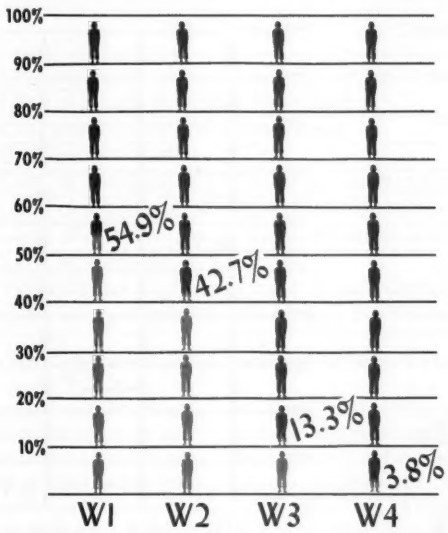

FIGURE 3: Attritee percentages according to career intentions

the CW4s indicated that they intended to separate prior to retirement eligibility.

Location of the Attritees. For those installations surveyed, the AWOs current installation assignment did appear to be related to his or her decision to separate. When asked what their career intentions were, those AWOs stationed at Ft. Ord, CA, indicated a higher attrition rate than the others. Ft. Lewis, WA, had the highest percentage of AWOs who classified themselves as undecided. USAREUR data indicated not only the lowest percentage of attritees but also the highest percentage of retainees (figure 4).

The Attritee's MOS. The percentage of AWOs who indicated they would either get out or were undecided, but would probably get out (by MOS, figure 5) was as follows: First, the utility/observation helicopter pilots MOS (100B) had 39.4 percent. Second, the attack helicopter pilots MOS (100E) had 21.5 percent. Third, the cargo helicopter pilots MOS (100C) had 21.3 percent. It was no surprise to find the fourth and smallest group in this category to be the fixed wing pilots MOS (100Q/100R) with 11.2 percent.

Source of Entry. We found that 30.5 percent of those who came into the warrant officer program from civilian life indicated they would either get out or were undecided but would probably get out. By comparison, we found that 31.1 percent who came in from inservice/prior enlisted entry were in this same category. Contrary to the popular belief these two figures were much closer than had been anticipated.

FIGURE 4: Location of attritees

Type Warrant Officer (as per his/her statement of intentions)	INSTALLATION								
	Ft. Ord	Ft. Bragg	Ft. Campbell	Ft. Hood	Hawaii	Ft. Rucker	Korea	Ft. Lewis	USAREUR
Attritee	27.8	20.6	19.4	18.7	16.7	16.1	13.3	7.1	6.8
Undecided	36.1	29.4	32.0	37.3	28.5	35.7	36.0	45.3	38.0
Retainee	36.1	50.0	48.6	44.0	54.8	48.2	50.7	47.6	55.2

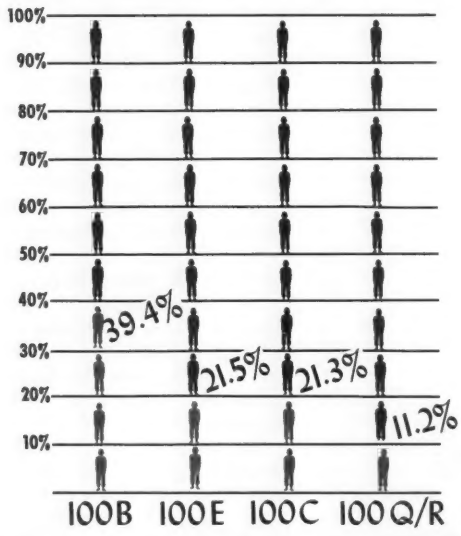

FIGURE 5: Attritee percentages according to MOS

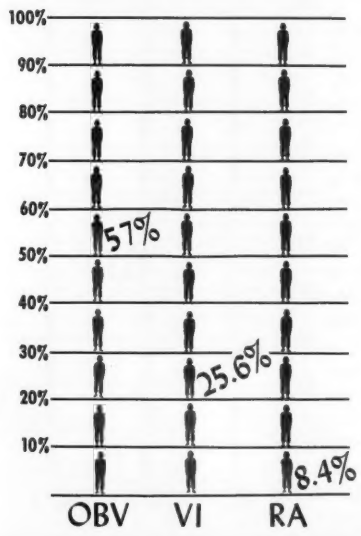

FIGURE 6: Attritee percentages according to current career status

Current Career Status. We learned that 57 percent of the obligated volunteer AWOs surveyed (figure 6) indicated they either would get out or were undecided but leaning toward getting out. For the voluntary indefinite group this figure was 25.6 percent. The regular Army group had only 8.4 percent who did not plan on staying in until retirement.

Reasons for Leaving. A major outcome of this research resulted in a prioritized listing of the considerations for attrition. This list indicated the considerations which were designated as of primary importance in the AWOs decisions to separate from the Army.

Careful scrutiny of the top 10 attritee considerations in figure 7 indicates that these considerations relate to three primary areas: pay and benefits (items number 1, 3, 4 and 9), leadership and supervision (items 2, 5, 6 and 8), and assignment and career factors (items 7 and 10).

It is highly probable that a cumulative effect of considerations existed which may have influenced the attrition decision. For example, it is unlikely that unequal flight pay alone could have been the major influence on attrition. However, even slight pay inequities can produce dissatisfaction whch may become a deciding factor when other considerations are already influencing the decision to leave.

So What Now? The present study found that pay and benefits, leadership and supervision, and assignments and career management are areas which are the most important relative to AWO attrition. The similarity between Air Force and Army pilot attrition data is sriking in that the same kinds of factors were found to be accountable for Air Force pilots separating from the service. Pay and benefit issues, which were ranked highly by all personnel surveyed, are already a primary part of one DA action plan. Although raising base pay, equalizing flight pay and restoring benefits may temporarily compensate

Attritee Rank Order	Consideration
1	Unequal flight pay (warrant officer flight pay versus commissioned officer flight pay)
2	Lack of concern for the individual
3	Low pay (all pay and allowances)
4	Erosion of benefits
5	Lack of competence in aviation matters by chain of command
6	Lack of professional respect and recognition from commissioned officers
7	Lack of opportunity for desirable installation assignment
8	Lack of leadership
9	Potential for higher paying aviation related position outside of the Army
10	Lack of predictability of future in the Army

FIGURE 7: The top 10 considerations influencing AWOs' decisions to separate

for other unresolved problems, these unresolved issues may continue to influence the attrition rate. Therefore, action plans being developed by DA also concern assignment/career management improvements, leadership issues and secondary factors as well.

"Pilot attrition cannot be reduced by one or two simple solutions such as higher pay. It is quite clear that personnel management policies as well as issues related to leadership management and supervision must be addressed along with other factors causing dissatisfaction." ***Air Force Times,*** November 1980, LTC Rosenbach and Major Gregory.

More To Come. In the second article of this series, we will take a closer look at all 46 separation considerations and their rank order. We will compare the rank order of the considerations given by AWOs and the commissioned officer aviators. In the third article we will provide more detailed demographic information on the groups surveyed. In the fourth, Warrant Officer Division will present the action plan developed to aid in resolving those factors addressable by MILPERCEN, affecting AWO retention. Additional information will be available on the results of this investigation when published as an ARI Technical Report during the fourth quarter of FY 1981.

About The Authors

CW3 Carl D. Everhart has worked at the U.S. Army Research Institute Ft. Rucker Field Unit since June 1979 with one 6-month break to attend the Warrant Officer Senior Course. With more than 12 years as an aviation warrant officer, CW3 Everhart has attained a bachelor's degree in Aeronautical Sciences, qualifications as a rotary wing instrument flight examiner and a UH-1 standardization instructor pilot. He is a Regular Army warrant officer and has had assignments to Vietnam; Germany; Ft. Riley, KS; Korea; and Ft. Rucker, AL. CW3 Everhart is a Senior Army Aviator with more than 4,000 accident free flying hours

Dr. Michael G. Sanders is the Technical Team Manager for Aviation Selection and Training at the Army Research Institute Ft. Rucker Field Unit. He has been involved in initial entry rotary wing training and aviator selection research since 1978. Prior to joining ARI, Dr. Sanders conducted research on aviator workload, fatigue and aircrew performance at the U.S. Army Aeromedical Research Laboratory from 1973 to 1978. He is also a Mobilization Designee in the U.S. Army Reserves, serving as a Medical Service Corps Health Service Research Psychologist (68T)

HEAD PROTE

AND A WHO

AVIATION HELMETS in the days of the open cockpit were designed to provide protection from the elements. These sought-after historic relics, along with the goggles and accompanying white scarf, were signs of the "real aviators" or barnstormers or (gulp) wing walkers.

Since that time, along with other major technological advancements, came the enclosed cockpits and two-way radios. The helmet, in civilian aircraft, lost some of its glamour and soon lost its popularity. Within the military (especially in helicopters) the helmet was here to stay. Soon, microphones and speakers for the two-way radio communications were built into the helmets so that the crewmember's hands could remain on the controls while using the radio. Great strides were also taken to give the wearer protection from head injuries during a crash.

Along with the growth in the size and power of the aircraft we fly, came the hazard of permanent hearing loss. A requirement to protect the crew from this danger was levied on the aircraft and the helmet. The Army began developing a helmet which would: (1) reduce head injuries; (2) reduce

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CTION

LE LOT MORE

hearing damage; (3) house communications equipment; (4) hold a visor; and (5) become a place for very personalized and sometimes very elaborate graffiti. The SPH-4 was the Army's solution—and is still the mainstay within the Army.

The advanced attack helicopter (AAH) is being developed as a highly mobile tank killer, effective in day, night and adverse weather. Operational testing is being conducted and will be complete this month. The ASARC/DSARC (Army/Defense System Acquisition Review Councils) process will follow with an AAH production decision in December 1981.

Among the elaborate, sophisticated equipment onboard this aircraft are the Pilot Night Vision Sensor (PNVS) and the Target Acquisition Designation Sight (TADS) which act as the eyes of the two crewmembers. In order to provide the crewmembers with the most effective display of the information "seen by these eyes," a video capability was needed *on the helmet.* This video image, provided to the crewmembers, was required to have a one-to-one size relationship with the real world, and have a 30 degree by 40 degree field of view. To put this in perspective, with a viewing distance of 10 feet, a TV screen

would have to be about 5 feet, 4 inches by 7 feet, 3 inches, to give similar coverage.

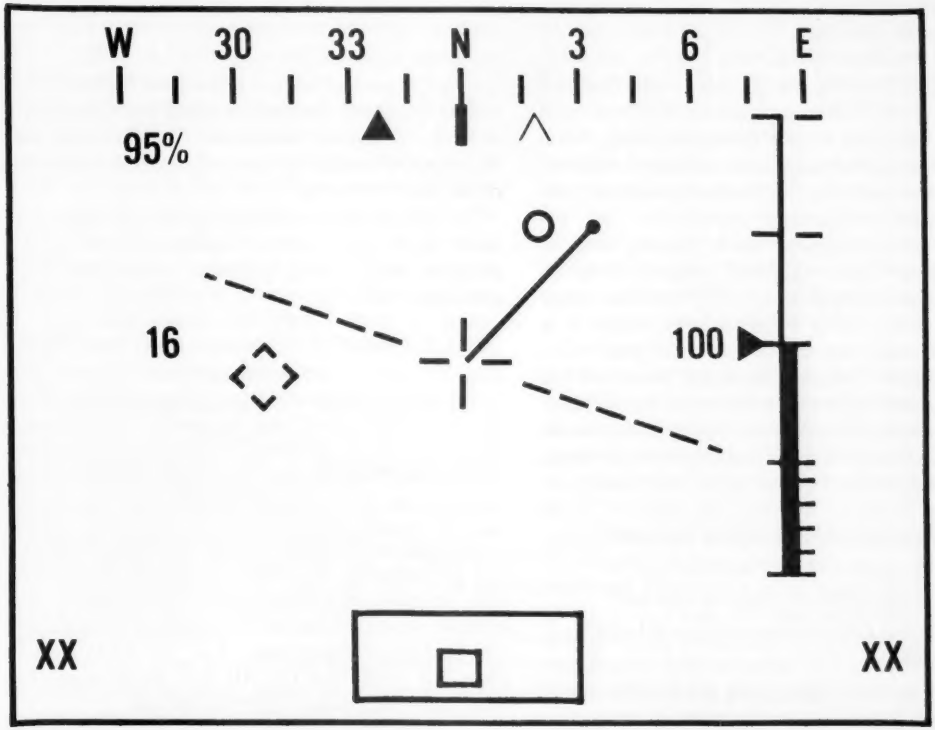
Because of size and weight consideration, a miniature "wide screen" was designed to be mounted on the helmet, so that it could be viewed with one eye. The helmet not only supports the helmet display unit (HDU) but also provides head line-of-sight (LOS) signals such that the natural head motions of the crewmember direct the TADS/PNVS turrets and 30 millimeter (mm) gun turret in a one-to-one angular correspondence. The LOS of the crewmember is determined electronically, using four infrared sensors mounted on the helmet (figure 1).

Early testing showed that even with a sophisticated wide field of view visually coupled system such as this, the pilot workload could be drastically reduced by providing piloting information on the imagery. Figure 2 shows the set of symbols used in the transition mode (which is usually used during nap-of-the-earth flight). Other modes which have slight variations in symbology are cruise, hover and bob-up. In addition to those, weapons symbology for 2.75 rockets, HELLFIRE missiles and the 30 mm gun is shown when required.

The SPH-4 helmet was initially considered for modification to accommodate the video system

FIGURE 1 (left): Helmet showing the infrared sensors and helmet display unit

FIGURE 2 (below): Typical AH-64 flight symbology—transition nap-of-the-earth mode: The minimum essential set of flight symbology includes: Airspeed: 16; power management: 95 percent; radar altitude: 100 and vertical tape; artificial horizon: dashed line; instantaneous vertical speed: ▶; heading: tape; hover symbology: velocity vector and acceleration circle; sensor LOS: reticle; aircraft LOS: diamond; NAV steering: ∧; status: xxxx; TADS Sensor pointing: ▲. It also includes AAH weapon symbology for the 2.75 rockets, HELLFIRE missile and the 30 mm gun when appropriate. The solid line with the bulb is the velocity vector. At the bottom the large box represents the field of regard of the sensor and the small box is the field of view



but was eliminated early in the program in favor of a new lighter weight helmet shell. The new helmet, known as the Integrated Helmet and Display Sight System helmet, came into being to fulfill this requirement. It was designed to provide equal or greater crash and acoustical protection than the SPH-4, but at a lower weight and with more stability on the head in order to maintain the crewmember's eye alignment with the HDU.

This helmet, unlike any other, does provide "head protection and a whole lot more" and is an important part of our "Total Weapon System."

Directorate of Evaluation/Standardization

REPORT TO THE FIELD

IN AUGUST 1979, the Training and Doctrine Command (TRADOC) commander directed each TRADOC school to form a Branch Training Team (BTT) that would visit proponent units in the field to "establish and thereafter maintain a productive dialogue" between the units and the schools.

The U.S. Army Aviation Center Training Analysis and Assistance Team (ACTAAT) is the Ft. Rucker, AL, BTT. Since inception, the ACTAAT has visited nearly all active Army Aviation units. While it is difficult to assess the effect that ACTAAT visits have had on the field, the feedback produced has had a measurable effect on activities at the Aviation Center. In this month's report to the field, we would like to solicit your professional opinion on one major issue that has been developed by the ACTAAT.

TACTICAL INSTRUMENT FLIGHT

1. *"Who will emplace the tactical beacons?"*
2. *"Who will report the destination weather?"*
3. *"What should I do or where do I go if I don't break out VFR?"*
4. *"If I can't get there NOE, there is no need going!"*
5. *"If the destination weather is 200 feet above the highest obstacle, why can't I go NOE?"*
6. *"Attack companies fight in platoons—not single ships."*
7. *"What about the air defense artillery threat?"*

Do you recognize any of these thoughts? Do you understand the current tactical instrument philosophy? Your answers are likely to be yes and no, respectively.

To give order to this discussion of tactical instrument flight, it is important to recognize the basic guidelines requiring this activity. Army Regulation (AR) 95-1, Chapter 6, Section VIII establishes the requirement for rotary wing aviators to successfully complete an Army instrument flight evaluation which consists, in part, of tactical instrument flight planning and an approach. Beyond the initial instrument certification, the annual instrument requalification also requires the aviator to successfully pass evaluation of the same two tasks.

To sustain aviator proficiency in tactical instrument flight, the aircrew training manual (ATM) requires rotary wing aviators to perform three associated tasks:

Task Number 4511 — Tactical Instrument Flight Planning
Task Number 4512 — Tactical Instrument Takeoff
Task Number 4513 — Tactical Instrument Approach

Looking in Chapter 5 of your ATM (new series), you will note that two iterations of each of the three tasks are required semiannually. You will also see the asterisk indicating that the three tasks are mandatory standardization flight tasks. The "I" (ATM para 5, page 5-2) reinforces the AR 95-1 requirement for mandatory instrument flight evaluation.

Now, having an understanding of where the requirement to perform tactical instrument flight training and proficiency is found, let's look closer at the training publication which tells how to perform instrument flight in the tactical evironment. Field Manual (FM) 1-5, Chapter 23, gives us the "how" to do tactical instrument planning and flight.

Three points are clear in the FM. First, tactical instrument flight will only be performed when meteorological conditions at origin or en route preclude nap-of-the-earth (NOE) flight. Second, threat weapons will affect when and where tactical instrument flight can be performed. Third, in view of points one and two, the individual aviators must be qualified and proficient in order to successfully accomplish their

missions in the tactical instrument environment.

Look closely at the FM, figure 23-1. You will notice that there are two instrument flight regimes—standard and tactical—that are "dictated by enemy detection and engagement capabilities, terrain/obstacle clearance and navigational aids availability." Admittedly, the previous quotation is rather nondescript for peacetime purposes; however, it does provide three interesting items for further attention and investigation.

What is the enemy's engagement capability on the high threat—mid to high intensity battlefield? Enemy aircraft are always a threat, but if they are hunting an Army helicopter in the tactical instrument regime—how many hunters are looking at them? Since the SA-4 is found at the Soviet Army level and intended as a deterrent to medium to high altitude aircraft, perhaps it is realistic to dismiss the SA-4 as a threat to Army helicopters. The SA-6 is likely to be the most realistic threat to an Army helicopter flying single-ship at 400 feet above the highest obstacle within 25 kilometers (km) of the forward line of own troops (FLOT). Certainly there are numerous threat systems within 15 km of the FLOT. If you accept this analysis of the threat, then equate the distance of 25 km to the tactical unit dispersal on the ground. Where are you in relation to a maneuver brigade tactical operations center (BTOC) or trains area? We might view this (25 km from the FLOT) as the forward limit of the tactical instrument flight regime based on the SA-6 threat.

The second item, navigational aids availability, is another factor requiring some investigation. Who supports the beacon and advisory requirements for tactical instrument flight? The short answer to the question is *no one!* FM 1-5 indicates that pathfinders will be operating the AN/TRN-30(V1) beacon. A search of division tables of organization and equipment (TOEs) (not modification TOEs) reveals that pathfinders are not authorized below corps level (three exceptions are airborne divisions, airmobile divisions and the air cavalry combat brigade). In fact, the AN/TRN-30(V1) beacon is not taught in the pathfinder course.

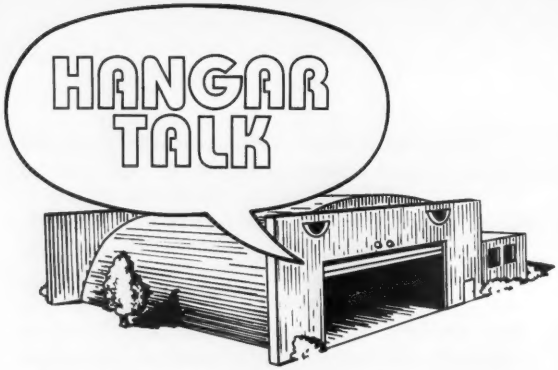
The air traffic control (ATC) platoon that is attached to the division is there to provide an instrumented landing site and through the use of the three-man tactical team, the platoon leader is capable of establishing a second site. The divisional A'i C assets are simply not capable of supporting flight in the tactical instrument regime. The division instrumented landing site, provided by the ATC platoon, actually represents the forward limit of the standard instrument flight regime, or if preferred, the rear of the tactical instrument flight regime.

The third issue derived from figure 23-1 is terrain/obstacle clearance must be assessed based on the area in which your unit will operate. Some units are currently in that area; others must estimate the topographical aspects of the areas in which they expect to fight from afar. In any case, the topography will simply exist and will affect where the tactical instrument regime can be established.

Perhaps the bottom line on whether or not a unit should expect to employ tactical instrument flight depends on the type missions anticipated. Our combat developers have given categorical arrangement to Army Aviation units—"Supporters and Fighters." If your unit has a "supporters" role, perhaps demands of aerial resupply and logistics to the brigade trains area or medical evacuation will require the aviators in your unit to be tactical instrument qualified and proficient. If you are in a "fighting" unit, the ability to safely recover from the main battle area in the event of inadvertent instrument meteorological conditions may require aviators in the unit to be tactical instrument qualified and proficient.

Whether or not tactical instrument requirements are valid for the Army aviator force is currently being examined at the Aviation Center. We have intentionally opened the issue to you, the user, through basic discussion in this article hoping to spark your professional concern which might provide the Aviation Center better insight into the issue of tactical instrument flight. Won't you take the time to share your opinions with us? Please write to: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES-E, Ft. Rucker, AL 36362.

DES welcomes your inquiries and requests to focus attention on an area of major importance. Write to us at: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES, Ft. Rucker, AL 36362; or call us at AUTOVON 558-3504 or commercial 205-255-3504. After duty hours call Ft. Rucker Hot Line, AUTOVON 558-6487 or 205-255-6487 and leave a message



"Hangar Talk" is a quiz containing questions based on publications applicable to Army Aviation. The answers are at the bottom of the page. If you did not do well, perhaps you should get out the publication and look it over.

TC 1-134

COMMANDER'S GUIDE FOR THE AIRCREW TRAINING MANUALS

CW2 Gary R. Weiland
Directorate of Training Developments
U.S. Army Aviation Center
Fort Rucker, AL

1. Meeting requirements of the Aircrew Training Manual (ATM) may not necessarily qualify aviators for flight pay.

A. True
B. False

2. Individual aviators will be integrated into the unit's aircrew training program within how many working days after reporting for duty in an operational flying position?

A. 5
B. 30
C. 90

3. Commanders may reduce the minimum semiannual flying hour requirements by 15 percent for what classification of highly proficient aviators?

A. Aviator readiness level (ARL) 1, flight activity category (FAC) 2
B. ARL 1, FAC 1
C. Both A and B above
D. None of the above

4. An aviator who fails a no-notice flight evaluation and is reclassified ARL 3 is relieved from meeting ARL 1 flying hour requirements until he/she again becomes ARL 1.

A. True
B. False

5. An aviator must complete ATM flying hour and task/iteration requirements to be given credit for successful completion of the Aviator Annual Proficiency and Readiness Test (AAPART).

A. True
B. False

6. What type of Night Hawk (NH)/Night Vision Goggle (NVG) training may be conducted by an NH/NVG qualified pilot on orders as an NH/NVG unit trainer?

A. Daylight filter only (NVG) and NH
B. Day and night continuation training (NH/NVG)
C. For initial NVG qualification; daylight filter only
D. B and C above

7. What is the minimum frequency an aviator must perform a 1-hour NVG flight to maintain currency?

A. Every 6 months
B. Every 30 days
C. Every 60 days

8. An aviator is *required* to fly both UH-1 Hueys and OH-58 Kiowa helicopters. If the UH-1 is designated as the primary aircraft, what will be the designation of the OH-58?

A. Alternate aircraft
B. Additional aircraft
C. Designation not required

9. An aviator newly classified ARL 1 during the fourth month of the 6-month training period is required to complete what fraction of the semiannual flying hour requirements?

A. 1/3
B. 1/2
C. 2/3
D. 3/3

10. How frequently must an aviator receive low-pressure, high-altitude refresher training to maintain currency?

A. Every 3 years
B. Every 5 years
C. Refresher training is not required

ANSWERS
TC 1-134

1. A (para 1-4d)
2. A (para 1-4e)
3. B (para 2-6c)
4. B (para 2-6d(3))
5. B (para 2-8a)
6. D (para 2-13d(1)(g))
7. C (para 2-14b)
8. B (para 2-2)
9. A (para 2-6d(1) and note on page 2-7)
10. A (para 2-17c)

REPORTING FINAL

Late News From Army Aviation Activities

FROM ST. LOUIS

Fuel Conservation. The U.S. Army Aviation Research and Development Command (AVRADCOM) has begun the initial phase of an aviation fuel conservation program. Near-term goals are to prepare and evaluate a new operator manual format for optimum performance flying and to conduct an operational evaluation of a calculator flying aid to assist in the fuel conservation program. The program includes a procedural analysis of flight operations, development of trial chart formats, an operational unit field evaluation of the new charts and the programing and eventual field evaluation of the calculator. The procedural analysis will investigate methods of reducing ground running time and optimizing mission profiles. Flight testing is being performed by the U.S. Army Aviation Engineering Flight Activity, Edwards Air Force Base, CA, to obtain additional data for optimum performance operations. The U.S. Army Aviation Center, Directorate of Evaluation and Standardization, Ft. Rucker, AL, and the Troop Support and Aviation Materiel Readiness Command, St. Louis, are mutually involved with AVRADCOM in accomplishment of the program.

(AVRADCOM—LTC Thomas C. Rankin)

FROM WASHINGTON

Aviation Three-Stars. Major Generals John W. McEnery and James H. Merryman have been nominated by the President for the rank of lieutenant general and will subsequently receive new assignments. Major General McEnery, now chief of staff of Forces Command, will become chairman of the InterAmerican Defense Board, Washington, DC. Major General Merryman will be the Deputy Chief of Staff for Research, Development and Acquisition, Department of the Army, Washington, DC. He is now the assistant DCSRDA.

FROM FORT IRWIN

New NTC. The Army's new National Training Center opened in July.

Army heavy combat units throughout the continental United States (CONUS) will be rotated through the NTC for intensive 2-week training periods. Those rotations will be managed on an increasing scale and eventually every tank and mechanized infantry battalion in CONUS will go through the training center every 18 months.

The NTC's permanently assigned opposing forces (OPFOR) will be composed of troops and equipment from the 6th Battalion, 31st Infantry (Mechanized) and the 1st Battalion, 73rd Armor. These battalions will represent a Soviet motorized rifle regiment. They will be trained in Soviet tactics, will be dressed in Warsaw Pact style uniforms, and will be equipped with replicas of Soviet-type threat vehicles. Both the OPFOR and the friendly forces will use the multiple integrated laser engagement system, enabling them to receive immediate feedback on targets.

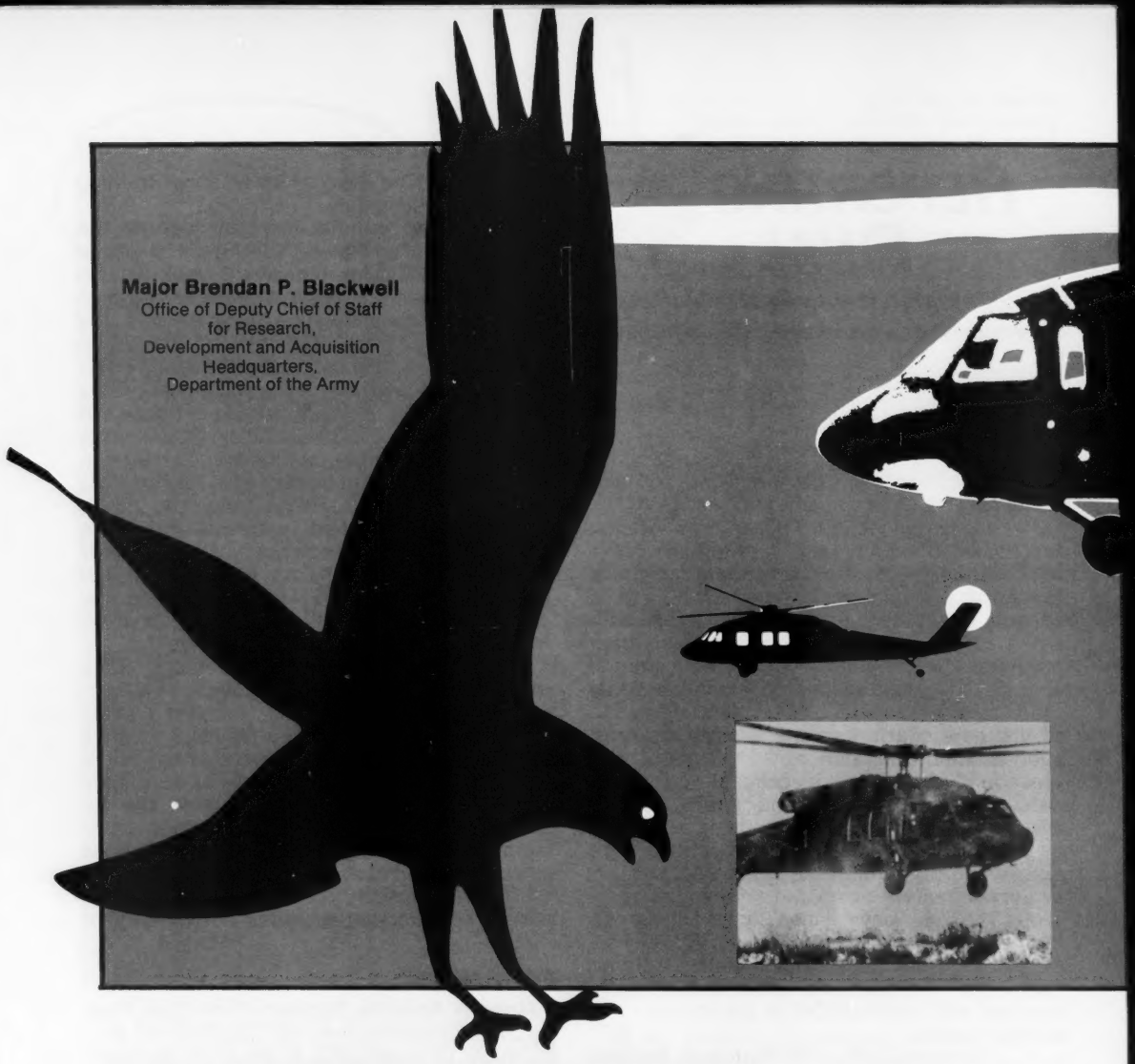
Once a unit has completed force-on-force training against the OPFOR troops, it will participate in live fire training, applying combat skills on a realistic training battlefield. The range will permit free play for both offensive and defensive operations, using every weapon system available to the battalion commander. The defensive array will consist of more than 1,000 targets. Smoke, artillery, attack helicopters, close air support, electronic and chemical warfare—all will be employed to create the most realistic combat environment possible. **(NTC-PAO)**

FROM KOREA

Mohawk Records. Sergeant First Class Mark G. Dvorak recently flew his 1,000th hour as a technical observer (TO) in an OV-1 Mohawk, and he was awarded a plaque by his unit, Company A, 146th Military Intelligence Battalion, Camp Humphreys. The sergeant, who has been a Mohawk TO since 1965, is now stationed at Ft. Hood, TX.

Brigadier General Don Parker, former commander of the 17th Aviation Group (Combat) and Eighth U.S. Army aviation officer, has logged 2,000 hours as an OV-1 Mohawk pilot. He began flying the Mohawk in 1961 and is one of the few active duty Army aviators who have 20 years in the aircraft. The general left Korea in May for his new assignment as deputy director of requirements and Army Aviation Officer with the Office of the Deputy Chief of Staff for Operations and Plans, Washington, DC. **(146th MI-PAO)**

Major Brendan P. Blackwell
Office of Deputy Chief of Staff
for Research,
Development and Acquisition
Headquarters,
Department of the Army

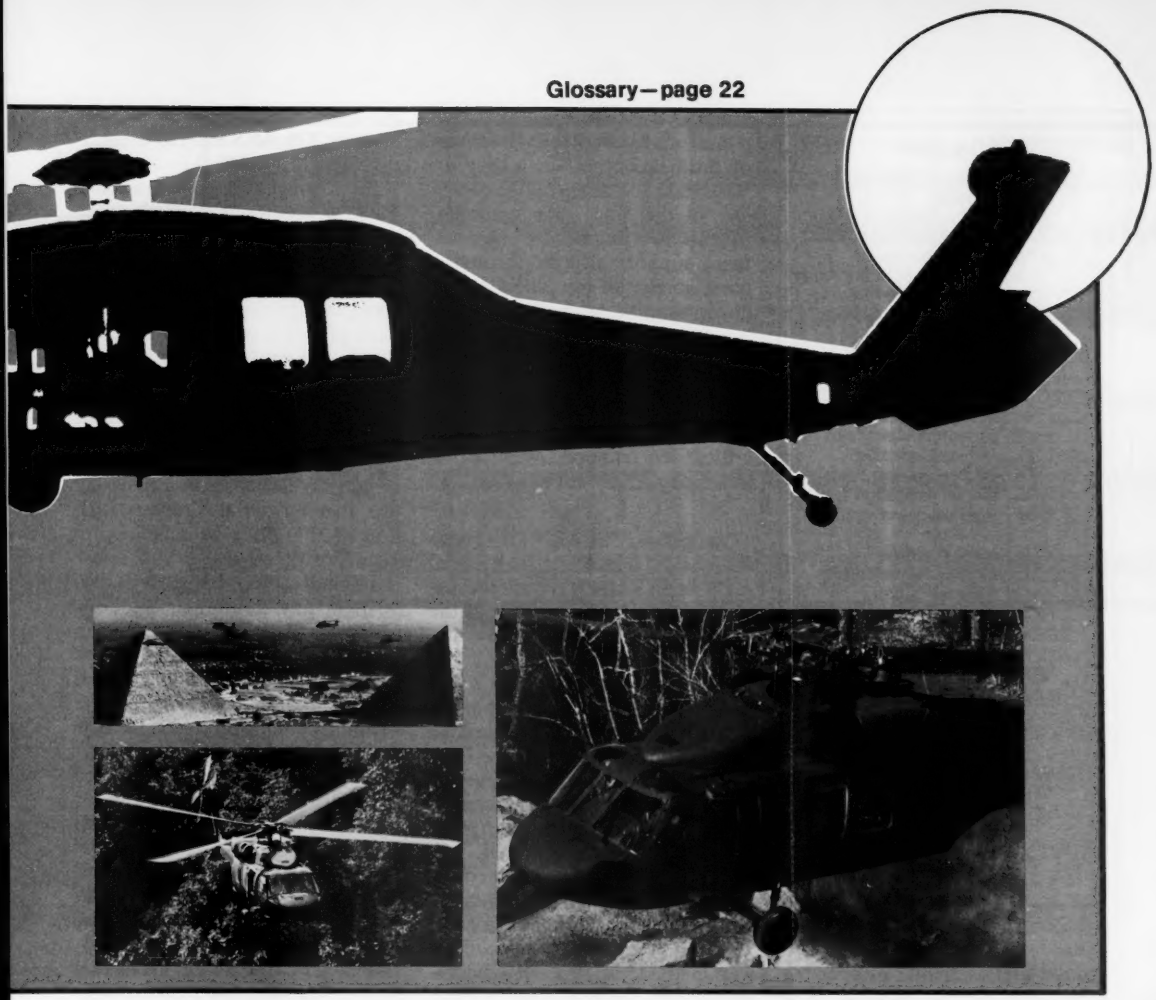


BLACK HAWK AROUND THE WORLD

PART II: THE STARTING LINE

The U.S. Army was the first to fly a helicopter nonstop coast to coast when an H-21 named Amblin' Annie accomplished the feat in August 1956 (see October 1956 *Aviation Digest*). Now there is a golden opportunity for the U.S. Army to be the first to fly a helicopter around the world.

Glossary—page 22



THE CONCEPTUAL route calls for the flight to begin from underneath the St. Louis Arch, the "Gateway to the West," in late May 198?, and terminate there after a west to east circumnavigation of the globe in late June. Each of the two ATW UH-60As will require about 165 flight hours to accomplish the flight in about 30 days. The C-12 support aircraft will each fly a little more than 100 flight hours within the same timeframe. Each leg was evaluated in terms of the feasibility of flying each of the legs at 10,000 feet cruise altitude or below, and the UH-60A can fly each leg without special routing or treatment with the exception of the critical leg between Nemuro, Japan and Shemya AFB in the Aleutian Island chain.

Figure 1 shows a network of the parallel activities required for the success of the critical leg. More will be said later concerning the support team. A team with fuel and tools will be prepositioned at the preselected site in the vicinity of Nemuro, Japan the day prior to the critical leg flight. The purpose of the team is to top off the ATW UH-60As with about 500 gallons of JP-4 each (1,600 gallons total), conduct a thorough safety-of-flight check of both helicopters and "baby-sit" them until departure at 0600 the following day.

The network shows C-12 no. 2 arriving at Chitose (Hokaido) the same day the ATW aircraft land at Naha, Okinawa. The personnel aboard the no. 2 C-12 will ensure that the prepositioned U.S. Army equipment (at Chitose) is onsite and available to set up operations

GLOSSARY

ADF	automatic direction finder
AFB	Air Force Base
ARS	air rescue squadron
ATW	around the world
DA	Department of the Army
DARCOM	Army Materiel Development and Readiness Command
DCSLOG	Deputy Chief of Staff for Logistics
DOCL	day of critical leg
Doppler	navigation radar system
FMS	foreign military sales
FORSCOM	Forces Command
IFR	instrument flight rules
INS	inertial navigation system
loran	long-range navigation system
mph	miles per hour
NATO	North Atlantic Treaty Organization
NCO	noncommissioned officer
NCOIC	noncommissioned officer in charge
NM	nautical miles
Omega	long-range navigation system
REFORGER	Return of Forces to Germany
TACAN	tactical air navigation
VHF	very high frequency
VOR	VHF omnidirectional range
VTOL	vertical takeoff and landing

2 days later at Nemuro under the supervision of the ATW senior NCO in charge, approximately along the schedule shown in figure 1. While the ATW helicopters with C-12 no. 1 fly to Yokota Air Base, the support team is in transit on the ground and arrives at Nemuro to begin setting up operations. The following day (DOCL-1) the support team will take the final steps required to be ready to accept the ATW aircraft when they arrive from Misawa Air Base. The day of the critical leg, final checks will be made of the ATW UH-60s and they will depart by 0600. The no. 1 C-12 will depart from Chitose so as to pass near the helicopters as they depart on the critical leg. After the ATW support team members are delivered to Chitose, the no. 2 C-12 will depart and pass nearly overhead of the helicopters when they are 500 to 600 NM along on the critical leg. In this way some communications are maintained with the team support aircraft through a good portion of the critical leg by direct support personnel. Similarly, HC-130 air sea rescue aircraft will be onstation along the route as shown for both navigation and rescue support. Using this plan, the ATW team can successfully fly the critical leg equipped with appropriate navigation capabilities.

Navigation. The ARN 131 Omega navigation system provides the ATW team with a navigation capability during the 50 percent of the ATW trip when standard low altitude navigation systems will not suffice. It is planned to be the primary system when out of reach of the ground based, limited range systems normally used by light aircraft. The current system weighs about 50 pounds. The unit is in production and, after the Australian Omega station is certified, will provide the necessary signal coverage for the entire ATW mission. Other commercial systems are available and in test aboard helicopters with the Federal Aviation Administration and are expected to more than meet the navigation requirements (at weights under 30 pounds) of the critical leg for the ATW mission.

Each of the two C-12 support aircraft and each of the two ATW UH-60As would be equipped with ARN 131s on loan from the Air Force.

As a backup to the ARN 131s, the ATW program would receive not only air sea rescue coverage by air sea rescue units of the Air Force, but also be provided en route winds, sea state and weather observations by the HC-130 covering the critical leg. On the critical leg, the 33d Air Rescue Squadron based at Kadina in Okinawa, Japan would provide navigation assist to all ATW aircraft. The ARS HC-130 is equipped with TACAN, Loran, VOR, ADF, Omega, Doppler and INS together with weather search radar. These systems permit the HC-130 to provide navigation assistance as well as air sea rescue coverage for the entire flight. The 33d ARS aircraft would provide as much in the way of a safety factor as could reasonably be included for such a world record achievement.

Risk. One of the possible statements of criticism mentioned earlier was that an aerial circumnavigation of the globe in a helicopter would be "somewhat risky." There is a risk of failure, but there is also a high probability of success. Measures have been included in the ATW plan to avoid failures or accommodate levels of degradation in the mission to avoid a catastrophic conclusion to this history-making flight.

The aircraft has demonstrated reliability and durability under severe field conditions. Less than half of the flight is over water and none of the flight is to be conducted at gross weights beyond that permitting single engine operations. The aircraft will experience the steady-state flight conditions of climb and cruise. The reliability of the UH-60 combined with a conservative flight profile support a high probability of success. U.S. Army crews during the war in Vietnam frequently flew helicopter combat and combat support missions over periods exceeding 10 to 12 hours. Pilots *(singly)* flew world record missions in the YOH-6 of more than 1,900 NM which took 15.75 hours. U.S. Army pilots can readily fly the ATW mission and cope with the fatigue of extended periods of flight.

If, however, fatigue becomes a critical factor, the crews will be rested, especially in view of the schedule flexibility permitted where no existing world record betterment is being attempted.

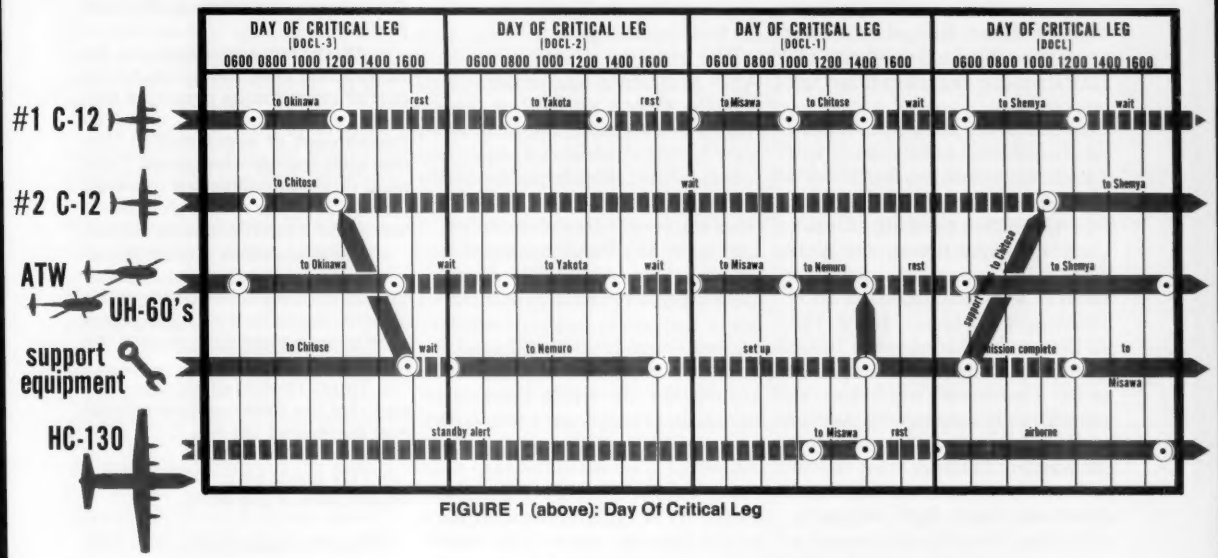
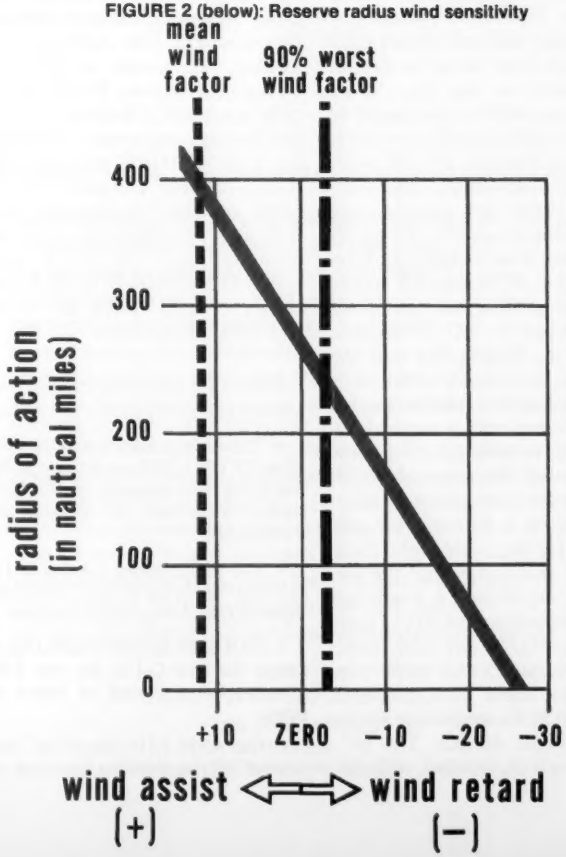


FIGURE 1 (above): Day Of Critical Leg

The ATW flight was back-planned from the critical leg and the timing of the departure was similarly keyed at arriving to fly the critical leg during the middle of June when the weather is most favorable. June is historically the month during which the percent frequency of occurrence of ceilings less than 200 feet and visibility less than one-half mile at Shemya AFB is at its lowest. Other stations through Japan and Alaska, on the whole, experience marginal weather during June less than 5 percent of the time.

The winds on the critical leg are a major factor bearing on the success of the ATW flight. Figure 2 shows the relationship between headwind factors (a net wind retard factor) and a tailwind component (a net wind assist on the fuel reserve expressed as a radius of action at a true airspeed of 130 knots). In June, for this trip, the *mean* wind factor at 10,000 feet is +11 knots. That is, the aircraft, on the average, would have not less than an 11-knot tailwind component giving the aircraft an expected average ground speed of 140 knots. This speed

FIGURE 2 (below): Reserve radius wind sensitivity



would result in a critical leg flight time of under 10 hours, on the average, which gives the ATW aircraft more than a 3-hour fuel reserve.

In June, the 90 percent worst case winds historically result in a 3-knot headwind component for a flight at 10,000 feet from Nemuro, Japan to Shemya AFB, Alaska. Using this wind factor, the flight time on the critical leg would take about 11 hours and leave the ATW helicopters a 2-hour reserve. The 90 percent worst expected winds provide an adequate margin of safety. The aircraft would have to experience in excess of a 20-knot headwind component before fuel exhaustion. Tolerance for the 90 percent worst case conditions listed above supports a high probability of success, but additional measures are planned to improve the probability.

The flight will not depart until the average wind factor, or better, is forecasted for the flight route and Shemya AFB is forecasted to have near optimal surface weather conditions. Further, HC-130 ARS aircraft will measure the exact wind factor at 10,000 feet and sea state along the route to verify the better than 10-knot wind assist factor forecasted. The ATW aircraft would not depart until actual conditions were checked by HC-130 aircraft for both the helicopters and the C-12s. The probability of failure is greatly reduced by departing on the critical leg with a verified 10-knot, or better, tailwind component for the route. With an actual 10-knot tailwind component at takeoff, and with a forecast for this condition for the entire flight, there is a small probability that the aircraft will experience a headwind component beyond the 20 (+) knot limit tolerable. In any case, intelligent decisions can be made concerning the flight as it proceeds with the HC-130s measuring actual winds at flight altitude. The HC-130, it should be recalled, will also augment the navigation function for the critical leg.

The risk associated with the ATW program is acceptable! The UH-60A has an established track record of infrequent dynamic systems failure which would require a forced landing. Repair/replacement of components under austere conditions can readily be accomplished. The ATW UH-60A is expected to fly above the standard maximum gross weight fewer than 10 flight hours and never beyond normal maximum power and transmission limits. It must be remembered, further, that the whole mission is essentially steady-state flying with relatively few high-low-power cycles and virtually no maneuvering.

The general approach considered for the ATW flight is one in which people from an active U.S. Army unit equipped with the UH-60A and other people from the Aviation Development Test Activity at Ft. Rucker, AL, would, as part of a deployment exercise, fly two specifically equipped UH-60As—in addition to those required—to Europe for a REFORGER exercise. The 101st Airborne Division (Air Assault) and the Development Test Activity are the best units to accomplish the feat. The ATW team would then continue on and complete the flight by the end of the REFORGER exercise.

Cost. The following assumptions were made with respect to costing:

• The flying hours for the UH-60A (2×165=330) be funded within the flying hour program for the 101st Airborne Division (Air Assault) and FORSCOM.

• The flight hours for the C-12s (2×108=216) be funded within the FORSCOM flying hour program.

• DARCOM and DA DCSLOG arrange for two C-12s for the ATW mission for a period of about 45 days.

• The ARN 131s (four) be "borrowed" for the mission from the Air Force and returned at mission completion.

• All aircraft preparation be accomplished at Ft. Campbell, KY, by aircraft maintenance personnel with technical assistance provided by Department of Army civilian UH-60A technical representatives. Technical representatives are routinely located at bases with high concentrations of rotary/fixed wing aircraft.

• The Black Hawk Project Manager's Office oversee/manage acquisition of the ATW tanks and the safety of flight release for the 23,250-pound ATW gross weight if required in the timeframe.

• The C-12 Project Manager ensure that the safety of flight release was generated for the C-12 ATW maximum gross weight.

• TDY funds be provided by the Department of the Army.

Given the assumptions, it would require less than $200,000 above that which would normally be programed for the required flying hours to permit the U.S. Army to fly around the world in a helicopter for the first time in history.

Program Design. After designation of the project, three immediate priorities would be established by the participating aviation units. *First* a technical/performance study must be done to determine the exact aircraft configuration and airspeed/altitude profiles to optimize range. This also would include a detailed assessment of risk. A long-range navigation capability also would be selected/defined.

The *second* effort would be a detailed cost definition covering all aspects of the project, and the *third* would be a detailed route options and feasibility analysis.

At this point, a go/no-go decision would be made based on the defined aircraft capabilities, an assessment of the risk, a detailed cost analysis of the project and the most feasible route. Upon approval of the project, many parallel activities would be "kicked off" in the execution of the preparation phase.

It is proposed that the 101st Division modify/upgrade the aircraft to include the additional long-range tanks and installation of the navigation system.

The pilots and the maintenance team should be selected from the personnel who are best qualified because of their demonstrated flying skills, experimental test flight expertise, physical condition and military experience. The crews also should be able to present a strongly positive public image.

Two C-12s would fly a refined support package (personnel and equipment) and assure adequate advanced preparation at planned landing points. This aircraft has the capability to support the mission and permit the entire project to be almost solely a U.S. Army effort.

Other activities to accomplish would include:

- **National Aeronautics Association/Federation Aeronautique International arrangements for certification of the record.**
- **Definition/validation of the route, to be followed by resolution of any international interface problems. Following definition, the navigation support package would be developed.**
- **Pilots would be selected and trained in aircraft performance, ditching and navigation to include IFR flight as an emergency procedure.**
- **The execution phase would be accomplished in 30 days, be followed by a phaseout which would include restoration of the aircraft to standard configuration and return of the aircraft to the unit from which they were drawn.**

ATW Team. The around-the-world flight team should be made up of personnel from the 101st Division and Ft. Campbell and the Aviation Test Board to the extent possible. It is expected that the team will include men and women (both the men's and women's records can be set) and represent the finest personnel performing in their respective specialities.

The two UH-60As would require four pilots at least one of which would be an experimental test pilot. One would be an 0-3/0-4, the ATW mission commander and the others would be appropriately rated aviation warrant officers. The C-12s would be crewed by an 0-3 with maintenance experience and the remaining three crew positions would also be filled with aviation warrant officers, one of whom should have extensive maintenance experience.

The ATW support team would be led by a UH-60A qualified 0-3 maintenance officer who would also act as the lead element landing ahead of the ATW UH-60As on each leg to ensure that previously arranged billeting and facilities are ready as programed. A UH-60A maintenance test pilot qualified aviation maintenance warrant officer would be next in charge of the maintenance team and be responsible for ensuring that the ATW UH-60As safely depart on each leg. The maintenance team NCOIC would be an E-6 or E-7 qualified as a UH-60A maintenance supervisor. The remaining five people would be a C-12 crewchief, a UH-60A crewchief, an engine specialist, a hydraulics specialist and an avionics specialist crosstrained as an electrician.

The challenge exists as it did when the U.S. Army first flew aircraft around the world in 1924, as it did when Charles Lindberg first soloed the Atlantic in 1927, and when the Army's Amblin' Annie proudly completed the first nonstop coast-to-coast helicopter flight in *August 1956.*

Now, the Black Hawk can carry the banner for the Army and the United States in the first helicopter flight Around the World!

Some Army Aviation Records And Firsts/*Aviation Digest Coverage*

- ☐ **The first nonstop, coast to coast helicopter's flight**/October 1956, page 10
- ☐ **The first Army aviator**/June 1962, inside back cover
- ☐ **The first Army Aviation pilot class**/July 1962, page 11
- ☐ **The first training fatality**/July 1962, page 14
- ☐ **The first Army helicopter pilot**/July 1962, page 24
- ☐ **The first tactical training helicopter course**/July 1962, page 24
- ☐ **The first Army aviators in combat**/November 1962, page 36
- ☐ **The first Army Aviation fixed wing self-deployment outside the North American Continent**/May 1963, page 12
- ☐ **Army Holds 13 World Aviation Records**/July 1964, outside back cover
- ☐ **Army Research Compound Helicopter Flies 222 mph**/August 1964, page 34
- ☐ **New Heights**/July 1965, page 48
- ☐ **OH-6 Flight Records**/December 1966, page 48
- ☐ **CH-54 Shoots for Record**/May 1968, page 31
- ☐ **The first helicopters at the South Pole**/September 1968, page 13
- ☐ **Army Aviation's first flight simulators**/May 1970, page 23
- ☐ **CH-54 breaks existing records**/September 1980 (Reporting Final), page 19

Copies may be obtained by writing to

the ***Aviation Digest***
P.O. Drawer P,
Ft. Rucker, AL 36362

AIRMOBILITY IN THE 1980s

continued from Page 5

and indirect) for combined arms team elements.

The pressing needs of the Army demand that we act immediately to fill these and other doctrinal voids. But as we do this we must maintain a continuous dialogue among the schools and between these schools and the units in the field. We can ill afford to have our doctrine writers operating in an ivory tower, unaware of the innovative tactics and training programs being developed by field units.

Doctrine must be practiced in training and Army training must take on a new dimension if we are to ensure the success of our leaders and Soldiers on future battlefields. Our officers, especially commanders at all levels, must be expert in combined arms operations and know how to integrate every element of the combined arms team on the battlefield in order to exploit their individual and collective capabilities to the fullest. In addition, they must be innovative and creative in their tactical thought and judgment.

J.F.C. Fuller noted after World War I that leaders of modern armies need special preparation. "The more mechanical become the weapons with which we fight," he wrote, "the less mechanical must be the spirit which controls them." The initial entry and transition flight programs at Ft. Rucker, AL, must train Army aviators in this spirit, and training programs must be developed which will provide them with a strong foundation in tactical aviation skills.

To this end, the Command and General Staff College is making a concentrated effort to focus its curriculum on the realities of maneuver warfare by developing in staff officers and commanders sound tactical judgment and training them in the flexible application of combat power. Historical and theoretical readings are being added to the course to stimulate a more challenging and creative approach to training in tactical operations. Tactical studies are also being extended beyond the familiar arena of the Fulda Gap to various other regions of the world.

Similarly, the branch schools need to stress the realities of combat operations in the AirLand Battle. For the Armor and Infantry Schools the task is clear—they must revitalize the art of maneuver warfare and in so doing reeducate all elements of the combined arms team on the neglected art of offensive operation.

As a result of the Chief of Staff, U.S. Army decision in March 1979 to integrate aviation into the combat arms officer basic course and officer advanced course curriculum, 19 aviation shared tasks and 10 to 14 branch specific aviation tasks will be integrated into these programs of instruction. This solidifies the Army decision making Army Aviation a combat arm and ensures widespread instruction in employment of Army Aviation as a full-fledged member of the combined arms team.

Effective doctrine and training are more crucial today than ever before. We have entered what is probably the most dynamic period in the Army's history. This decade will witness the formation of new types of units, the restructuring of others and the fielding of high technology equipment. TRADOC is developing a viable concept for fighting the AirLand Battle throughout an extended battlefield. This is a challenge of unprecedented dimension and far-reaching demands because, as never before, the combined arms team will be employed to see deep, strike deep and support deep. We must "hammer" the enemy where he least expects it and where he is most vulnerable. To do so will require the skillful orchestration of each element of the combined arms team.

The next few years will see a reawakening of Army interest in airmobility. New concepts, organizations, procedures and techniques can and must be developed by the Army and commanders at all levels, as well as our aviators who must take the lead in this crucial endeavor. We must draw upon the important lessons of the Howze Board experiments, the 11th Air Assault Division tests, the Vietnam conflict, and more recent Middle East conflicts to synthesize the innovative combined arms ideas. An organization already exists, in the Air Cavalry Attack Brigade in the 9th Infantry Division, where new ideas can be put to the test. From that experience we should begin to build a set of doctrinal and tactical concepts that truly makes Army Aviation a full partner in the combined arms team in conducting the AirLand Battle. We need to stretch our imagination on how to employ attack units, air cavalry units and lift units. The Army is waiting for those of us responsible for doctrinal training developments to tell all the rest *how to do* the business of winning with Army Aviation. Let's move out!

PEARL'S

Personal Equipment And Rescue/survival Lowdown

Cool It!

For quite some time now, we have been advising you to keep your survival radio and strobe light batteries cool (which substantially prolongs their life) by storing them in a refrigerator. For an equal amount of time, you have been asking us how to go about getting one of these handy-dandy items, which also seem to be equally useful for storing your lunch, snacks and an occasional six-pack. Well, common table of allowances (CTA) 50-909 authorizes you a refrigerator, mechanical, household: 12.5 cubic foot capacity—per unit, activity or element thereof as required for storage of batteries. This refrigerator is listed under line item number R62804 and can be ordered from GO under national stock number (NSN) 4110-00-892-5921 (left hand door) or 4110-00-892-5948 (right hand door) at a cost of $140.00 each.

Radio Pocket Installation

We would like to draw your attention to U.S. Army Troop Support and Aviation Materiel Readiness Command (TSARCOM) message 061616Z May 81, subject: Installation of the New AN/PRC-90 Radio Pocket, NSN 8415-00-442-3616, on the SRU-21/P Survival Vest, Used in All Army Aircraft Except the OV-1 and RV-1. This message provides instruction to aircrew and life support personnel for standardizing the location of pockets and components on the vest. Included are specific directions for removing the first aid kit and tourniquet pockets, installing the new radio pocket, and installing the optional hunting knife and revolver holster. These directions will be published in the next change to TM 55-1680-317-23&P. If you need a copy of this message or further information, contact Mr. D. B. Hopkins, TSARCOM Directorate for Maintenance, AUTOVON 693-3715 or commercial (314) 263-3715.

Michelle Morton photo by Laurence Epstein

New Basis of Issue

We have some bad news and some good news for you. First, the bad news—in some instances it has been noted that some Department of the Army Civilian (DAC) personnel have been flying as crewmembers in Army aircraft without the benefit of the recommended protective helmet. This is due primarily to the fact that civilian pilots, other than test pilots and instructor pilots, are not currently authorized this

If you have a question about personal equipment or rescue/survival gear, write PEARL, DARCOM, ATTN: DRCPO-ALSE, 4300 Goodfellow Blvd., St. Louis, MO 63120 or call AUTOVON 693-3307 or Commercial 314-263-3307

PEARL'S

helmet under the provisions of CTA 50-900, even though DAC pilots are required to wear them in most instances.

And now for the good news—our request to amend the CTA has been approved by Headquarters, Department of the Army. When amended, CTA 50-900 will include under line item number K34252 as the basis of issue: "Per individual on flying status and passenger seat in observation aircraft; *civilian pilot;* civilian test pilot and instructor . . . ." This change should alleviate any problems which civilian pilots have been experiencing in obtaining flight helmets.

Rescue Hoist

Questions have arisen lately concerning the proper rescue hoist to use when lifting personnel and equipment onto Army helicopters. There are currently two hoists available, one which is safe to use, and the other which is not, so care must be taken to use the proper one. The older Breeze hoist (NSN 1680-00-183-5994) is *not* safe to use for lifting personnel or equipment; this hoist is to be used only for training purposes and only with dummy loads. The newer Western Gear hoist (NSN 1680-01-058-3671) has no restrictions on its use and is perfectly safe to use for lifting personnel and equipment. For further information, contact Mr. R. L. Sandberg, TSARCOM Directorate for Systems Management, AUTOVON 693-2955 or commercial (314) 263-2955.

Battery for Night Vision Goggles

Many of you have been asking for the correct battery NSN for the AN/PVS-5 night vision goggles. Although we don't actually handle actions on this piece of equipment, we know that sometimes it is difficult for you to find the proper source of information; so we are glad to find out for you and provide you with the information. The correct battery for the AN/PVS-5 is the BA-1567/U, NSN 6135-00-485-7402. It is available from B16 at a cost of $2.32 each. For further information concerning the battery, contact the item manager, Mrs. Ruby Cottman, at CECOM, AUTOVON 992-3985.

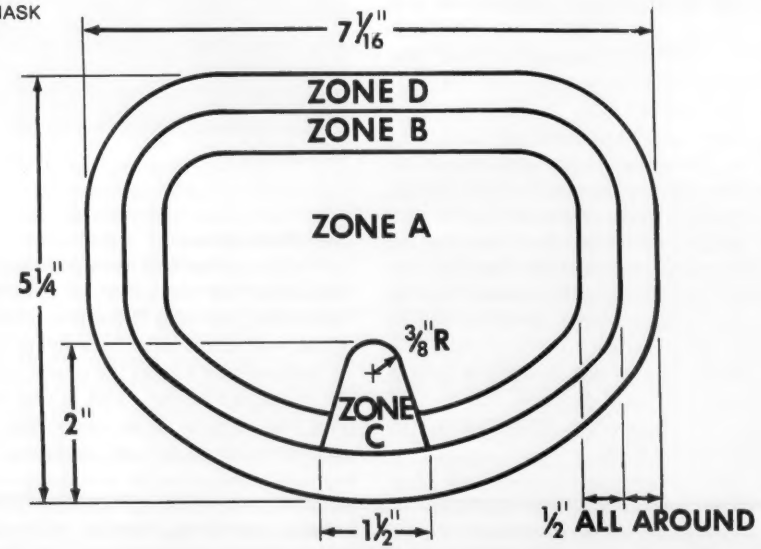
M24 Mask Problem

During a recent inspection of M24 protective masks, a potential safety hazard and material deficiency were identified. Blackspots, determined to be a fungus growth, were found in the layered lens of the mask. These spots obscure the wearer's vision and can hamper the safe operation of an aircraft.

This problem was brought to the attention of the U.S. Army Armament Materiel Readiness Command,

FIGURE 1: M24 MASK

This sketch is intended for in-process acceptance and inspection purposes only



which manages the mask; and the following solution was provided by that command's Maintenance Engineering Division.

- The current procedure is to retain the M24 protective mask until visibility is affected badly enough to present a safety hazard and severely impair reading capabilities.
- The procedure which will be followed, as soon as the supply position has stabilized, shall use the areas of affected vision by zones as indicated in figure 1.
  - Zone A may contain up to an aggregate total of two bubbles, imbedded particles or spots of 1/16 inch diameter or less provided that they are at least 2 inches apart. Zone A may not contain any scratches, abraded areas, creases or other surface imperfections which will interfere with vision.
  - Zone B may contain up to five bubbles, or imbedded particles of 1/16 inch diameter or less, provided that they are scattered in such a manner that they are at least 1 inch apart. Zone B may contain up to three scratches provided that they are not longer than 1/4 inch and not wider than .020 inch and they are at least 1 inch apart. Zone B may not contain creases and concave contoured areas, with permanent set, which distort vision.
  - Zones C and D shall not require examination.
- It should be emphasized again that the criteria above are only to be used when you are notified that the supply position has a good issue base.

Questions and Answers

We have a full-time ALSE noncommissioned officer-in-charge who was school trained at Chanute AFB, IL. Our shop maintains cold weather survival kits, survival vests, and night vision goggles and also provides training on these items. Our oxygen system is slowly coming together, but we still have a lot to learn. We are in need of some kind of school for oxygen equipment. Can you help us? (WO1 Charlie G. Ritter, D Trp, 1st Sqdn, 10th Cav, Ft. Carson, CO)

Your problem is not unique to your organization. Any Army Aviation unit anywhere in the world faces similar difficulties when it comes to servicing oxygen equipment. To find out about a school for this equipment, we first contacted the U.S. Air Force Training Command at Randolph AFB, TX, and the Chanute Technical Training Center at Chanute AFB. We were informed that there is an Aircraft Environmental Systems Mechanic Course, C3ABR42331-000, which is 70 days long and covers everything from basic physics and circuitry to air-conditioning, pressurization and oxygen systems. The problem with this course for Army purposes is twofold: first, it is not a life support course, but a mechanic course; second, although it does cover some gaseous systems, it primarily deals with liquid oxygen systems. Any further training required by Air Force personnel is obtained via minischools, usually set up at the base level, which provide instruction on the oxygen systems in specific aircraft.

We then contacted the U.S. Naval Air Training Center at Lakehurst, NJ, to see if the Navy has a suitable course which you could attend. Unfortunately, the story is much the same as for the Air Force—Navy life support courses do not cover the maintenance of oxygen systems, which is taught as an integral part of a mechanic course.

What we suggest you do, at least as an interim measure, is contact a nearby Air Force installation for support. Air Force personnel have the necessary experience in maintaining such oxygen systems and are usually more than willing to render assistance. Incidently, when the U.S. Army Transportation School at Ft. Eustis, VA, begins its Aircrew Life Support Specialist Course in fiscal year 1982, it will include as part of the curriculum limited maintenance on the onboard oxygen system.

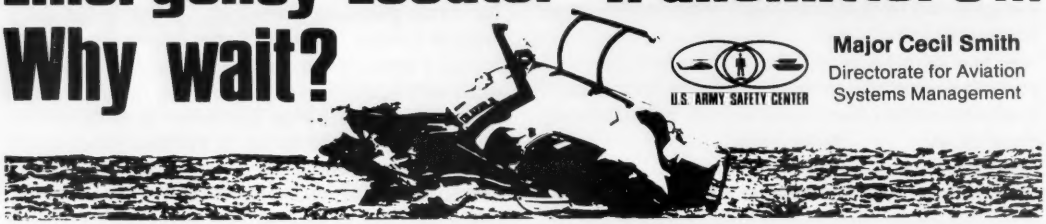
Upon reading your January 1981 PEARL article entitled "Aircrew Chemical Protection," we find that we have some further questions concerning the use of the chemical protective overgarment. Soldiers here in U.S. Army, Europe are issued the U.S. type as listed in the PEARL article while others are issued the British Mark III. We understand that the British overgarment will continue to be issued until stocks are depleted.

The Mark III is manufactured from a different type of material than the U.S. type. Could you please clarify for us whether or not we can fly with this overgarment? (CW2 Glenn S. Uchiyama, Air Troop, 11th Armored Cav Regt, APO NY)

To come up with an authoritative answer to your question, we decided to query Headquarters, U.S. Army Materiel Development and Readiness Command on the matter. Their answer was simply this:

Although the material in the Mark III overgarment is different from the current U.S. overgarment, the flammability and safety characteristics are comparable. Unit personnel may wear the Mark III overgarments on training flights consistent with the same restrictions as wear of the U.S. overgarment on flight training missions.

Emergency Locator Transmitters... Why wait?



Major Cecil Smith
Directorate for Aviation
Systems Management

THE U.S. ARMY Safety Center supports the installation of emergency locator transmitters (ELTs) in *all* Army aircraft. With an increasing requirement for the Army to conduct its own search and rescue, the survival radio and the ELT will serve as a "system" which will ultimately save time, money, and lives.

Historically, the Army has responded well in locating downed aircraft and crewmembers. However, we can do better! A survey was made of 82 mishaps involving fatalities which occurred between 1 January 1975 and 31 December 1980. Seventy-three of the mishap crash sites were located within 2 hours or less. Nine crash sites required extended time and effort to locate. The time ranged from between 3 and 4 hours to 23 hours. There is evidence in two of the nine cases which indicates at least two individuals may have survived had assistance arrived in a reasonable length of time. In one case, a survivor of the crash walked approximately 200 feet, sat down under a tree, and bled to death. In the other case, a survivor, although unconscious, lived for at least 20 hours but slowly bled to death before the crash site was located and assistance arrived.

Recently, in a mishap in Alaska, one aircrewmember's life was saved as a direct result of having a properly functioning ELT on board his aircraft. Conversely, more than $300,000 was expended, in flying costs alone, this past January searching for a UH-1H which went down in South America. The aircraft was not equipped with an ELT, and the aircraft and personnel have not been found. Considering the flying costs for the search mission, at $200 a copy, 1,500 ELTs could have been bought for Army aircraft.

There is support for installation of ELTs in selected aircraft operating in remote or isolated areas where a legitimate need has been established by the aviation unit commanders. Experience has proven that prolonged search time has been expended in Georgia, Kentucky, Oregon, Louisiana, and Hawaii; however, these states are not categorized as remote or isolated areas. Today, the Air Force has aircraft equipped with receivers which will pick up signals from downed Army aircraft equipped with ELTs. Future Army aircraft will also be equipped with receivers, and the Army will then take over part of the search and rescue missions involving rescue Army aircraft.

Since the early 1970s, when Congress enacted a law to install ELTs on general aviation aircraft, ELTs have been a source of constant problems because of inadvertent activations and failure to activate in an actual crash. Before 1979, the greatest single cause of unreliable ELT operation was the battery. The problems were primarily produced by a lithium-sulphur-dioxide ($LiSO_2$) battery which was not sealed sufficiently to prevent leaking or outgasing which is noxious, eye-irritating, incapacitating, and occasionally explosive. This problem created a fire hazard as well as a corrosion problem for both the aircraft and the ELT. In 1979, an FAA Airworthiness Directive required removal of $LiSO_2$ batteries from ELTs. This directive has been instrumental in significantly reducing ELT problems.

During a recent conference at the NASA Goddard Space Flight Center, current problems with ELTs were discussed. It was evident that in a large percentage of malfunctions the problems stemmed from improper user procedures, improper mounting/installation, and lack of quality control for some ELTs. The following problems were discussed:

- Mounting/installation. Users are not following mounting instructions published by the manufacturer. Loosely mounted ELTs produce vibrations which mask g forces or result in false activations. There are some cases where users cut ELT antennas for ease of installation on their aircraft. In summation, the quality control in the mounting and installation of ELTs is practically nonexistent.

- Out-of-specification switches. Lack of quality control has resulted in switches being too sensitive to vibrations and not sensitive enough to g forces. The results are false activations and no

activations during an actual crash.

- Batteries. The present problem with batteries is that they are either overdue replacement or completely unserviceable.
- Crashworthiness. Many ELTs are encased in plastic and cannot meet stringent standards necessary to survive a severe crash. Another problem associated with crashworthiness of an ELT is the antenna breaking and/or the antenna cable disconnecting from the ELT or antenna. Antenna disconnect occurs twice as often as antenna breakage.

With the current state-of-the-art, there is no doubt that a good, reliable ELT can be purchased for Army use. There has not been any requirement by the FAA to install ELTs in helicopters. With the Army's aircraft fleet being predominantly rotary wing, there has been some concern about the adaptability of an ELT to a helicopter. If or when the Army decides to purchase ELTs, detailed specifications and specific requirements established by the Army will result in an ELT that meets Army needs and is free of previous defects.

Consideration is being given to installing the ELT in the tail section of aircraft since experience has proven the tail section to be the most survivable area. Sometimes, however, the tail section does not receive sufficient g forces to activate the ELT. Remoting the g switch to the cockpit area of the aircraft may solve this problem. Additionally, a control for pilots to use inside the cockpit with an on/off reset capability, plus a visual indicator to alert the pilot that the ELT is operating, would be an ideal configuration and would provide an indication of inadvertent activations.

In addition to mounting the ELT in the most survivable area of the aircraft, several other requirements are being considered to improve the crashworthiness of the ELT. A solid state ELT with a good potting material, such as microballoons, encased in a metal container will make the ELT more survivable. Microballoons are a very good potting substance since they are removable, offering access to the ELT electronics for servicing. Their load-carrying ability absorbs energy to protect the electronics and aids in the puncture resistance of the ELT's outer case. They are also thermal resistant, which will aid in the survivability of the ELT in case of a fire.

The problem with the external antenna breaking or the antenna cable separating can be easily solved with an internal antenna. Although the internal antenna does not produce a signal as strong as the external antenna, the signal from an internal antenna can be received at extended ranges by use of sensitive receivers. There is no evidence of internal antennas breaking during a crash except when the ELT is completely destroyed.

G switches meeting FAA specifications are available. One consideration for helicopter use is an omnidirectionally activated g switch. One manufacturer has developed a switch which operates in conjunction with the engine oil pressure. If the engine oil pressure is lost, the ELT is activated. A built-in delay will prevent the ELT from activating during start-up and shutdown procedures.

Presently, NASA is developing an ELT which will be used in conjunction with a satellite. The concept involves the use of multiple satellites in low, near-polar orbits "listening" for distress transmissions. The signals received by the satellites are relayed to a network of dedicated ground stations, where the location of the emergency is determined. Information is then relayed to a Mission Control Center (MCC) which alerts the appropriate Rescue Coordination Center (RCC). The RCC then begins the actual search and rescue operation in accordance with conventional practice. The new ELT will operate on the frequencies of 121.5 and 406 MHz. The expected accuracy for locating a distress signal with the 406 frequency is 2 to 5 kilometers.

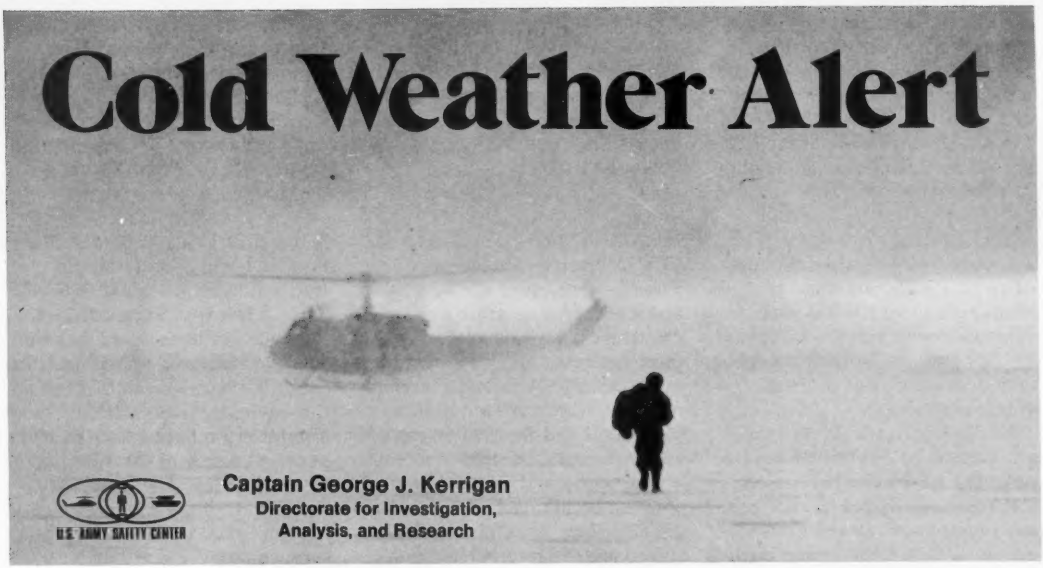
Studies have shown that even those who survive an initial aircraft crash have less than a 10 percent chance of survival if the rescue is delayed beyond 2 days. In contrast, if the rescue can be accomplished within 8 hours, the survival rate is more than 50 percent. Rapid location of a crash site can also significantly reduce both search and rescue costs and the length of exposure of search and rescue teams to hazardous conditions frequently encountered during these types of operations.

A properly functioning ELT is a most important aspect in locating aircraft in distress. The Rescue Coordination Center, Scott Air Force Base, reported that ELTs were instrumental in the location of 29 crash sites with 35 survivors in 1980.

Numerous misconceptions about ELTs have produced some negative reaction for ELT installation in Army aircraft. The data does not differentiate between specific ELTs, but refers to ELTs as a whole. It is evident that only a few ELT manufacturers have produced a high quality, reliable product.

The bottom line is this. The Army can purchase a reliable ELT, suitable for helicopter use, with minimum delay. When the technology and system are available for a product which has proven its value in saving time, money, and lives, why wait?

Cold Weather Alert



U.S. ARMY SAFETY CENTER

Captain George J. Kerrigan
Directorate for Investigation, Analysis, and Research

THOSE OF YOU stationed in Southern geographical areas are probably still sweltering from high summer temperatures, and thoughts of winter operations may seem remote. But for those of you in the arctic and subarctic regions, winter is right around the corner, so the time to plan and prepare is now—before the onset of cold weather.

Winter presents a multitude of hazards for both aviation personnel and aircraft operation—especially in Alaska and in other aera of the world where frigid temperatures prevail.

And while conditions associated with cold weather operations are probably more severe in Alaska, similar conditions exist in varying degrees in other parts of the world.

Pre-snow training

Among the numerous cold weather problems that plague Army aviators, rotor-induced whiteout during operations close to the ground is the most common. When encountering loose, powdery snow during flight, helicopter pilots often find themselves in the middle of a ball of swirling, visually cueless atmosphere. This is an ideal condition for inducing serious disorientation which often leads to the wrong flight control input or pilot freeze-up on the controls. Minimizing whiteout from rotor-wash requires special techniques. Fortunately, these techniques can and should be practiced before the first snowfall. The thrust of this training is to provide pilots the experience they need to handle blowing snow without actually experiencing whiteout.

The following techniques should be followed during both pre-snow training and snow operations.

- Takeoff should vary somewhere between a maximum performance takeoff when the flight path is clear of obstacles all the way to a near vertical takeoff when obstacles are present. For example, takeoff could involve a near vertical lift until clear of the snow cloud, a transition to a maximum performance takeoff until clear of the obstacles, and then a transition to normal climbout to en route altitude.
- Landing over loose, powdery snow is probably the most demanding phase of snow operations. The approach is almost a normal one with a slightly concave effect close to the ground and an appearance that the aircraft will land short of the actual touchdown point. This technique, coupled with a slightly higher airspeed on final, allows the pilot to stay ahead of the snow cloud until just before touchdown.
- Taxiing can be safely done in one of two ways. When in close proximity to other aircraft or buildings, the pilot's only choice is to keep the skids on the ground and proceed slowly in the desired direction, stopping as necessary to allow the visibility to clear. When room permits, aircraft should be flown to a hover and taxied at a faster rate than normal (about 10 to 15 knots). This method will keep the snow cloud behind the aircraft and provide

good visibility.

• Formation flying over snow has taken its toll on aircrews and aircraft. Depending on the nature of the terrain and condition of the snow, 5 to 10 seconds (about 200 meters) separation should be maintained during en route flying. As a rule, separation should be extended to at least 15 to 30 seconds just before arriving in the LZ to prevent having to land in a snow cloud produced by other aircraft. However, prevailing conditions such as extreme low temperatures could require a much greater interval (3 to 5 minutes) between aircraft landing in a small LZ.

All pilots, including unit IPs and SIPs, lose a certain amount of winter flying proficiency after several months of summer operations. Therefore, at the onset of the first snowfall, blowing snow refresher training should be conducted IP with IP or IP with the most experienced pilot.

Icing

Icing poses a serious hazard to both rotary and fixed wing aircraft. Icing in Alaska presents both bad and good news. The bad news is that icing can be very severe. The good news is that except for about 3 to 4 weeks at the beginning and end of winter it is usually too cold and dry for icing. Compared with Alaska, icing is a continuous threat in other areas of the world because of less severe temperatures and higher humidities. But regardless of the area of operation, icing conditions must be evaluated during weather briefings. Take, for instance, one Huey pilot who encountered unforecast icing less than one-half mile from the end of the runway. Within 30 seconds, while the pilot was turning back to the airfield, ice had obscured windshield visibility except for two 6-inch squares in the lower left and right corners. Only instant realization of the severity of this problem saved the crew from facing more serious danger than they had already experienced during the 1-minute flight.

Preflight and postflight requirements

Winter operations demand additional preflight and postflight requirements.

• Extended warmup time is required for drive train and electrical equipment.

• Flight controls should be thoroughly checked for ice buildup and complete freedom of movement before runup.

• Sufficient time should be allowed before hub system checks are attempted to avoid damaging brittle seals.

Many more requirements and suggestions can be found in the applicable aircraft operators manuals and TC 1-12.

Static electricity

The danger posed by static electricity is much greater during cold, dry seasons than during warm, humid ones. Static electricity can be generated by the movement of the aircraft through the air or by brushing snow and ice from aircraft surfaces. It is especially dangerous during refueling operations since friction generated by fuel flowing through the hose and past the filler neck can produce an electrical charge sufficient to cause a fire or explosion. Consequently, during servicing, it is extremely important to properly ground the aircraft as well as bond it to the refueling vehicle. As an aditional precaution, the nozzle should be fully inserted into the filler neck at all times. Also, before refueling aircraft, individuals should discharge any static charges built up in their bodies. They can do this by touching a properly grounded conductor.

Survival training and gear

Hopefully, aircrews will never find themselves in a cold weather survival situation. But no matter how sophisticated our weather reporting abilities, no matter how good our crews, no matter how well equipped and well built our aircraft, nature can get to us now and then. Thus, we must think about the unthinkable—survival.

If you have never been stationed in Alaska, it may be hard to imagine temperatures that range from 30 to 60 degrees below zero for weeks on end, winds that average 35 knots for 10 to 12 days, or a storm that piles snow into 8-foot drifts in a single night. Since Alaska presents an arctic-type cold climate, all crewmembers are required to attend the 4-day Air Force Cold Weather Survival School during their first year in Alaska. But for those of you in other areas of the world where this type of schooling may not be available, your best bet is to acquaint yourself with survival hazards contained in applicable cold weather FMs and TCs. After all, the alternative to being a fatality in a survival situation is to be properly clothed, to know exactly what to do, and to have the necessary gear to handle the emergency.

Units operating in cold weather areas are responsible for conducting a thorough and well organized training program. This training must be geared to instill confidence, to develop skills in all areas of cold weather operations, and to insure safety. The buck begins with the unit commander and travels down through the chain of command.

The key to successful winter operations is advanced planning and preparation—before Ole Man Winter sets in.

AR 600-105

"Aviation Service of Rated Army Officers"

ON 1 JUNE 1981, AR 600-105, "Aviation Service of Rated Army Officers," became effective. This personnel regulation consolidates, clarifies and simplifies procedures for personnel actions involving Army aviators. The new regulation applies the provisions of the Aviation Career Incentive Act of 1974 to rated Army officers.

One of the most widely questioned portions of the new regulation concerns a change in eligibility for aeronautical ratings and specifically the new requirements for the ratings of Senior and Master Army Aviator. Excerpts of para 2-3 (right), Tables 2-1 and 2-2 (below and right), AR 600-105 are provided for clarification of eligibility.

Additionally, AR 600-105 covers the following areas:

- Qualification, disqualification and requalification for aviation service.
- Procedures for convening and conducting a Flying Evaluation Board (FEB).
- Procedures for aeromedical consultation/in-flight evaluation.

It is essential that Army aviators remain cognizant of those Army regulations that impact upon their aviation service/career. Army Regulation 600-105 has simplified this task by consolidating several regulations into a ready reference for those aviation matters you need to know. Make sure your publications officer has a copy of this vital regulation.

Table 2-1. Eligibility Requirement for Aeronautical Ratings

Rating	Rated Service and Formal Training	Flying Time and TOFDC	Application Required	Other Requirements or or Remarks
Army Aviator	Army OFF/WO or WOC Rotary Wing Aviator Course, or	175 hours; at least 40 hours must be solo (10 USC 3691)	No	Medically qualified, class 2
	Rotary Wing Qualification Course (RWQC) or Fixed Wing Multiengine Qualification Course (for Reserve Component officers with civilian acquired skills—see para 2-4a), or	Completion of course requirements	No	Medically qualified, Class 2
	Undergraduate FW or RW pilot training by another U.S. service	Completion of course requirements	Yes	Medically qualified, class 2. MILPERCEN will determine other training required in accordance with AR 95-1 on acceptance into the U.S. Army
Senior Army Aviator	At least 7 years of rated aviation service; 4 years must be as an Army Aviator	At least 1,500 hours of flying time; or at least 72 months TOFDC	Yes	Medically qualified, class 2 (current); military instrument qualified (whether or not current)
Master Army Aviator	At least 15 years rated aviation service; 12 years must be as an Army Aviator or Senior Army Aviator	At least 3,000 hours of flying time; or at least 108 months TOFDC	Yes	Medically qualified, class 2 (current); military instrument qualified (whether or not current)

2-3 Award of Aeronautical Ratings

a. For Army Aviator or Flight Surgeon

(1) CG, U.S. Army Aviation Center (USAAVNC): *U.S. Army commissioned and warrant officers who have never held an aeronautical rating from a U.S. military service. Upon completion of flight or aviation medicine training. (Medical students not yet commissioned in Medical Corps are an exception—see below.)*

(2) HQDA (DAPC-OPA-V): *Interservice transfers who previously held an aeronautical rating in another service. Officers recalled to Army active duty or appointed in a Reserve component who previously held an aeronautical rating in another service.*

b. For Senior Army Aviator and Master Army Aviator

(1) Commanders having general court martial convening authority: *Officers on extended active duty.*

(2) Major overseas commanders, CONUS Army commanders, and CG, Reserve Component Personnel and Administration Center (RCPAC): *U.S. Army Reserve personnel not on extended active duty.*

(3) Chief, National Guard Bureau: *Army National Guard (ARNG) personnel not on extended active duty.*

Table 2-2. How to apply for an Aeronautical Rating

Aeronautical rating	Application will include	Comments
Army Aviator (with a rating from another U.S. Military service)	A copy of the original aeronautical rating (U.S. Air Force) or undergraduate flight training completion certificate (U.S. Navy, Marines, Coast Guard)	Include application as part of an interservice transfer (AR 614-120), a recall request (AR 135-210) or a direct appointment request (AR 135-100)
	An official certification of total military flying time by category (fixed or rotary wing), and skill qualifications, and hours flown in past 12 months	
	A current, class 2 flight physical completed within the last 12 months, approved by the U.S. Army Aeromedical Center (ATZQ-AAMC-AA-ER), Ft. Rucker, AL 36362	
	The signed statement below: "I understand that a service member who makes a false official statement, knowingly, may be punished under Article 107, UCMJ. With this understanding, I make the official statement below with the exception of medical suspensions of less than 30 days. I have never been restricted or suspended from flight duty and I have never been involved in an aircraft accident other than (if none, so state)— *a.* Restrictions from flight duty *b.* Suspensions from flight duty *c.* Military aircraft accidents *d.* Civilian aircraft accidents	
Army Aviators other than above	.....	CG, USAAVNC, will make awards without application
Senior or Master Army Aviator	The original aeronautical rating order if applying for the Senior award, plus the Senior Army Aviator rating order if applying for the Master award	To apply, complete DA Form 4187 (Personnel Action) and send through channels to appropriate headquarters (para 2-3b)

Captain William C. Barker
Department of Flight Training
Directorate of Training and Doctrine
U.S. Army Aviation Center
Fort Rucker, AL

There Is More To Threat Than Vehicle Identification

WHEN SOMEONE MENTIONS threat, what do you think of? Vehicle identification, friend or foe; weapons system capabilities or maybe even which units use certain types of equipment? But do you really know where the threat forces deploy this equipment and how it will appear in attack formations? If you are like many other aviators, probably not! We concentrate on ensuring that our personnel know the difference between threat and allied vehicles but we fail to emphasize where, in formations, vehicles appear. For instance, where the ZSU 23-4s from the gun battery in a motorized rifle battalion are located is important to both scout and attack aircraft. The formation being used by the threat forces will determine routes of movement into and out of firing positions, as well as the locations of the firing positions themselves. The three formations that we as Army aviators will see the most often are the advance guard, the hasty attack and deliberate attack.

Advance Guard. The advance guard for a motorized rifle battalion, as shown in figure 1, is used when contact with an enemy force is not imminent, to penetrate gaps in defenses, and to conduct the exploitation and pursuit. This formation could be encountered by our attack helicopter elements when they are used to slow down or stop a threat breakthrough or penetration.

Warsaw Pact forces will attempt to average 30 to 40 kilometers/hour (km/hr) by day; by night and during periods of limited visibility, they will attempt to average 20 to 25 km/hr. With tanks and artillery attached, 20 to 30 km/hr during the day and 15 to 20 km/hr at night is expected. These speeds are for the battalions of BMP (Russian amphibious armored infantry combat vehicle) equipped regiments. Each motorized rifle division has one BMP equipped regiment and two BTR (Russian amphibious armored personnel carrier) equipped regiments.

The interval between vehicles will be up to 50 meters during road movement and 50 to 100 meters during cross-country movement. Halts in the column will occur every 2 and 3 hours for up to 30 minutes. During the second half of a long march, halts will be 2 to 4 hours and vehicles will be dispersed and camouflaged. These longer halts will not be taken at night so as to make maximum use of the hours of reduced visibility.

A careful study of figure 1 will reveal that the advance guard provides its own all-around security. When aerial scouts or attack aircraft are approaching this formation, they should be aware of the column's security elements. Though they are not ZSU 23-4s or SA-9s, each motorized rifle platoon has an SA-7 Grail and a large complement of small arms. These weapons are sufficient to engage and destroy a helicopter.

While the advance guard has its own reconnaissance patrol, the regimental reconnaissance company will have its own reconnaissance patrol 20 to 50 km ahead of the advance guard. Exactly how far in front this reconnaissance element is depends on when threat forces made the penetration and where. This

patrol will normally consist of a PT-76 or BMP, a motorcycle and a BRDM-2. The regimental patrol should be completely destroyed wherever it is found to prevent it from reporting information to the advancing elements. To allow any element to escape only ensures your location will be known and reported to higher headquarters.

The recon patrol of the advance guard will consist of a motorized rifle platoon reinforced with a tank from the reinforcing tank company.

About 5 km behind will be the point of the advance guard. This normally contains a motorized rifle platoon, a BTR-60 engineer vehicle with engineer squad, a tank and a BRDM-RKH NBC reconnaissance vehicle. This last vehicle has the ability to monitor and mark nuclear, biological, chemical (NBC) contaminated areas without the crew leaving the vehicle. This vehicle is very important to the column; without it, the column has to manually monitor and mark NBC contaminated areas.

The vanguard element will be 1 to 1½ km behind the point. This element will consist of a motorized rifle company, minus one platoon in the recon patrol and one in the point, a tank platoon, a self-propelled (SP) howitzer battery (122 mm), an engineer platoon minus the squad with the point and an antitank platoon. The SP howitzer battery can be used in either an indirect or direct fire role. This artillery would immediately deploy to provide support to the recon patrol and point element on contact.

Between 5 to 10 km behind the vanguard comes the command group. This normally will consist of the motorized rifle battalion commander, the supporting artillery battalion commander and the motorized rifle battalion signal platoon.

Immediately behind the command group will be the reinforcing tank company headquarters followed by the ZSU 23-4 platoon. From this position, the four ZSU 23-4s can provide antiaircraft protection to the column and especially to the command group. Threat doctrine normally calls for the antiaircraft elements to be deployed close to command elements rather than closer to the maneuver elements. Where you find command elements you will find air defense artillery (ADA) elements and vice versa.

The supporting artillery battalion is next, minus the one battery with the vanguard element. Then the remainder of the antitank (AT) company, minus the platoon with vanguard, followed by the other two motorized rifle companies. Each of these companies provides a flank guard. This flank guard, located 1 to 1½ km from the main body, may be a single vehicle or a platoon. The rear company will also provide the rear guard. The other two platoons of the tank company are interspaced with the motorized rifle companies to provide armor support.

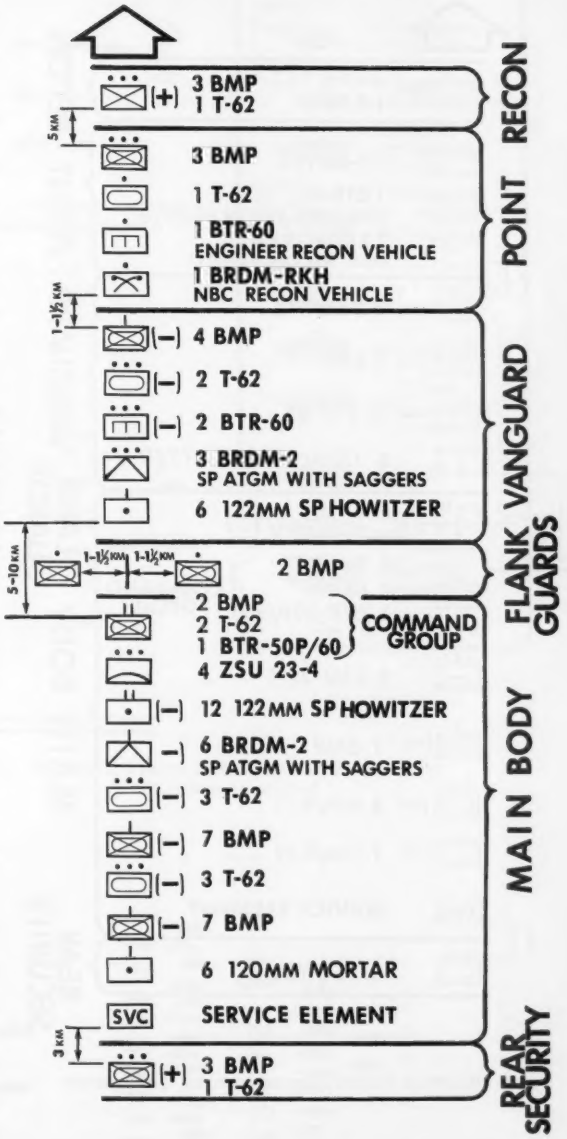


FIGURE 1: Typical advance guard for motorized rifle battalion

Next, there is the mortar battery of the battalion consisting of 6 to 120 mm mortars. The motorized rifle battalions rear services are next. Finally, there is a rear guard consisting of a reinforced platoon or a single vehicle.

While this represents a reinforced motorized rifle

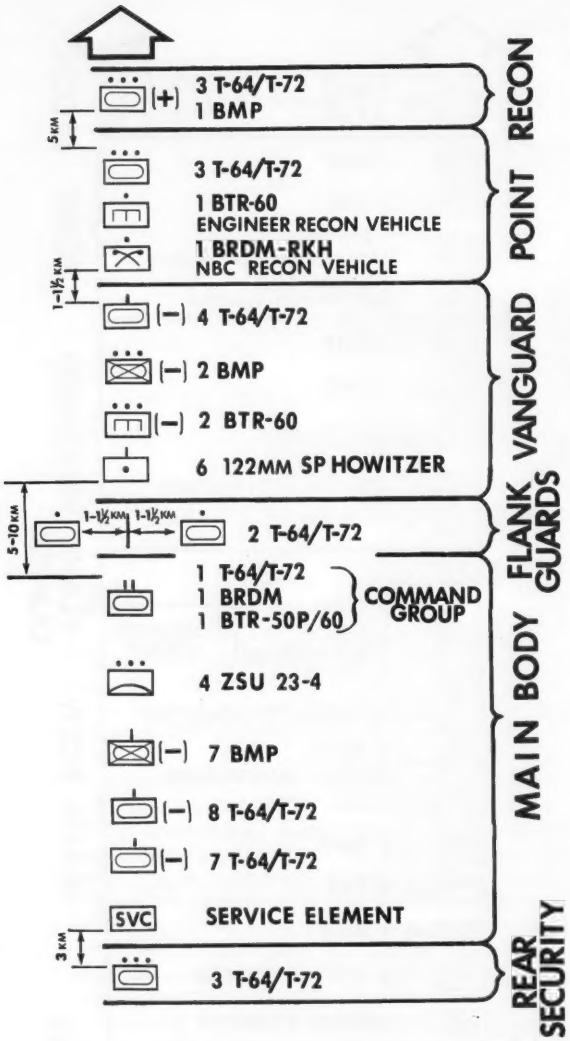


FIGURE 2: Typical advance guard for tank battalion

battalion, a reinforced tank battalion in an advanced guard is basically the same as shown in figure 2.

Hasty Attack. The hasty attack formation will normally be conducted by a battalion upon contact with enemy elements. Army Aviation units will see this formation when assisting company teams to stop Warsaw Pact forces after a breakthrough has taken place.

The threat battalion will deploy from an advance guard into the formation shown in figure 3. A motorized rifle battalion normally will have a tank company attached and this formation normally will be used. The battalion will usually deploy two companies forward and one company in reserve. The battalion will have an attack zone 1,000 to 1,500 meters wide by 3,000 meters deep.

Two platoons of tanks from the reinforcing tank company will lead (figure 4). About 300 meters behind the tanks will be the BMPs from the motorized rifle companies. The motorized rifle company commanders will be centered on and behind their companies.

About 1,000 meters behind the BMPs are the motorized rifle battalion commander and reinforcing tank company commander. They are followed by the ZSU 23-4s of the ADA gun platoon. The two batteries of the artillery battalion are on line with the ADA gun platoon. The ADA gun platoon and artillery battalion are followed by the antitank company minus its platoon dedicated to the vanguard.

The other motorized rifle company, tank platoon and artillery battery are usually positioned as far as 3,000 meters behind the line of attack and follow the company making the main effort.

Deliberate Attack. The deliberate attack formation normally will be used by a regimental sized unit when a hasty attack by a battalion sized unit has failed. The deliberate attack may take up to 6 hours to initiate after the hasty attack has failed. Army aviators will see this formation during Warsaw Pact attacks in Europe and elsewhere.

The deliberate attack formation is basically similar to the hasty attack formation but on a much larger scale (figure 5). Regiments will attack on about a 2.5 km front. Tanks will lead, followed by BMPs, then the second echelon motorized rifle companies. The command group follows these elements. An antitank platoon of the regiment will be on the flanks to provide overwatching fires. Behind these will be the ADA gun platoon's ZSU 23-4s and the artillery battalion, followed by the third platoon of the antitank company and ADA missile platoon's SA-9s. The second echelon battalion will be 2 to 3 km behind the lead battalion to exploit any penetrations or breakthroughs.

The deliberate attack will see an increased amount of artillery and support elements over the hasty attack due to increased planning time.

These three threat offensive formations will be seen whenever threat forces are encountered. Knowledge of these formations could make a difference in survivability of Army aircraft and the success of our operations.

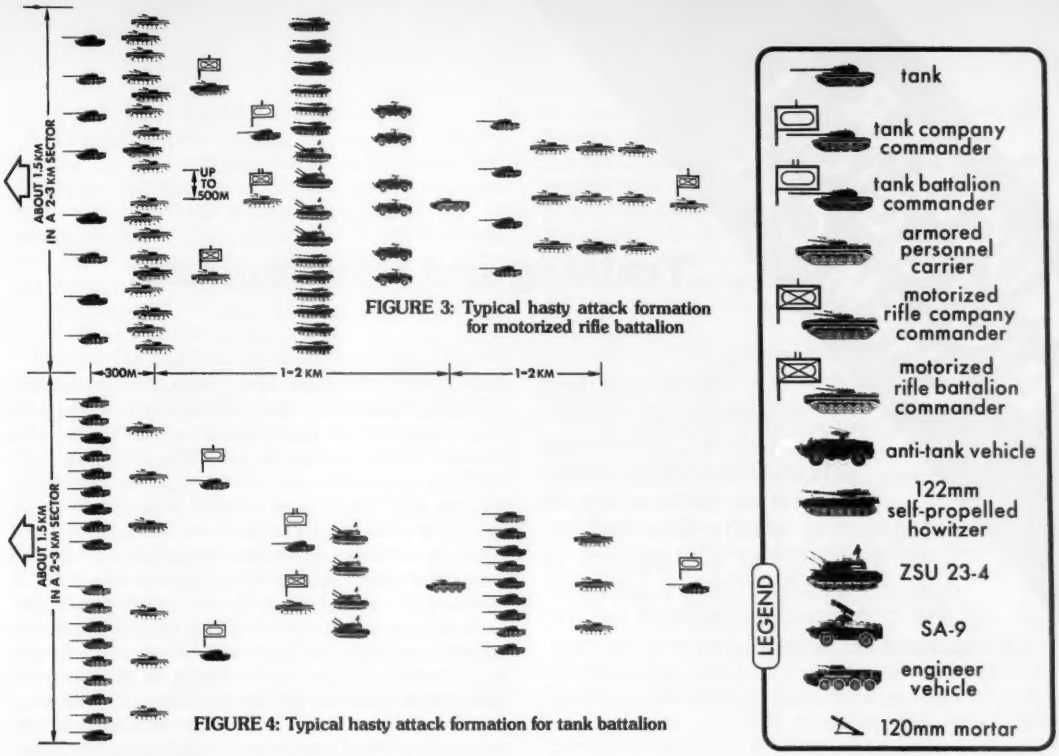


FIGURE 3: Typical hasty attack formation for motorized rifle battalion

FIGURE 4: Typical hasty attack formation for tank battalion

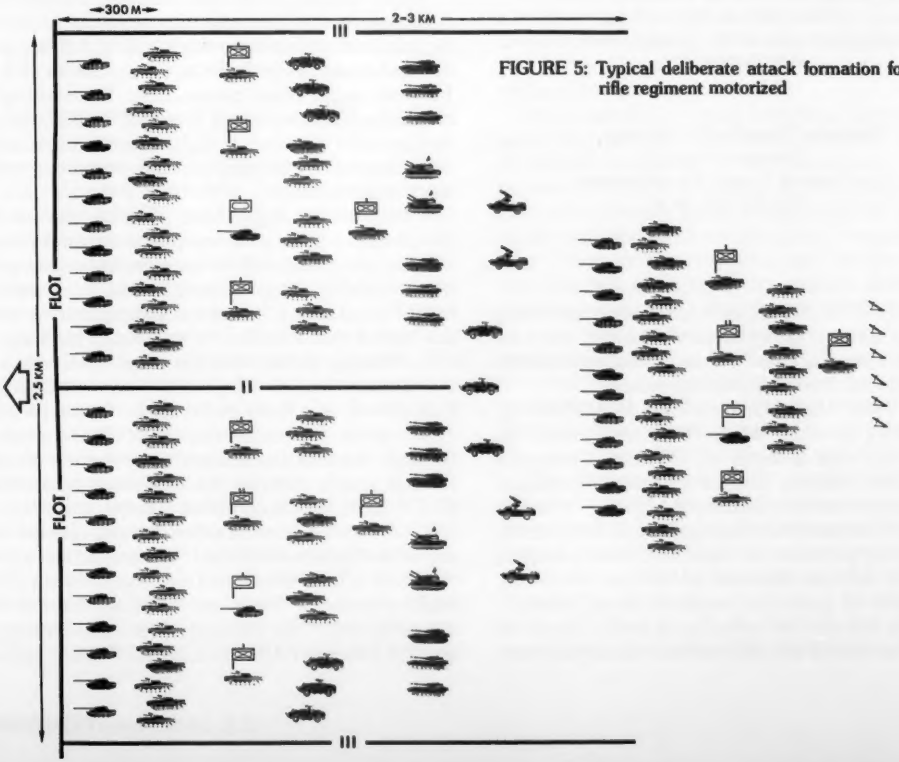


FIGURE 5: Typical deliberate attack formation for rifle regiment motorized

NUCLEAR BIOLOGICAL CHEMICAL

Training and Development

This is the first in a series of nuclear, biological, chemical articles intended to inform the aviation community of ongoing efforts directed toward achieving a capability to operate as an effective member of the combined arms team on the integrated battlefield.

Major Phillip H. Webb Jr.
Chief, NBC/ALSE Team
Directorate of Combat Developments
Fort Rucker, AL

Captain Timothy B. Savage
Chemical Officer
Directorate of Combat Developments
Fort Rucker, AL

IN RECENT MONTHS there has been an increasing awareness among Army aviators of the nuclear, biological, chemical (NBC) threat and of our need to fly and fight on the integrated battlefield.

In July 1980, Major General Carl H. McNair Jr., commanding general, Army Aviation Center, Ft. Rucker, AL, sent a letter to Western Command (WESTCOM), subject: Aircrew Chemical Protection. In it, General McNair discussed training, doctrine and some of the materiel development efforts currently underway and provided the Aviation Center's position concerning aircrew chemical protection. Following is a summary of guidance contained in that letter.

Training to meet the imposing chemical threat on the next battlefield is a difficult and hazardous task, particularly in aviation. The current aircrew chemical protective ensemble offers sufficient protection from the threat, but it complicates our ability to train safely. The ensemble includes the standard flight uniform (combat boots, Nomex flight suit and flying gloves, and SPH-4 flight helmet) with the following chemical protective equipment worn over it: overgarment, footwear covers, rubber gloves, M24 aircraft protective mask and the M7 protective hood.

The NBC complement is uncomfortable, bulky, reduces dexterity and contributes to heat stress; and some of its items are flammable when exposed to a high intensity flame. Nevertheless, it does provide protection from the threat; therefore, it is what we will use in the near term to fly and fight in the chemical warfare environment and, accordingly, we *must* train in it.

While training in the NBC clothing, aviation safety considerations dictate that the following procedures be followed. The Nomex flight suit and flying gloves are necessary components of the ensemble and must be worn under other components. For training, the ensemble will be worn only in aircraft with crashworthy fuel systems installed. If flight in an actual chemical environment is anticipated, the ensemble will be worn in all aircraft.

- On training flights, one pilot should not wear the chemical protective equipment in order to act as a safety pilot. That will be the most important part of a safe training program until more data is available on the visual acuity, heat stress and dexterity problems associated with wearing the protective clothing.
- Training should not be conducted when the aircraft crew station temperature exceeds 75 degrees Fahrenheit, wet bulb globe temperature (WBGT). Instruments for measuring WBGT are available through the unit flight surgeon or can be obtained through supply channels (national stock number 6667-00-159-2218, Wet Bulb Globe Temperature Kit).
- All aircraft crewmembers should receive training in the recognition and treatment of the adverse effects of heat. This should be provided by a qualified flight surgeon. If one is not available, section IV of TB MED 175 "The Etiology, Prevention, Diagnosis and Treatment of Adverse Effects of Heat," provides

excellent information for a unit lesson plan.

• The safety pilot should visually and verbally monitor the pilot wearing the protective ensemble. If the pilot exhibits any of the heat stress symptoms defined in TB MED 175, the training should be terminated and the flight surgeon consulted. Increased fluid intake is encouraged before and after all flights with the protective clothing. Contrary to expectations, individuals who are heat stressed often display a reduced desire to drink fluids.

In regard to unit training, the U.S. Army Chemical School, Ft. McClellan, AL, has recently developed an Army Training and Evaluation Program (ARTEP) NBC common module that has been approved by Headquarters, Training and Doctrine Command (TRADOC) for use in ARTEP development by proponent schools and integrating centers. This module will be integrated into future ARTEPs, is applicable to aviation units, and identifies missions and tasks that are critical to unit battlefield survival and mission accomplishment. TRADOC and Forces Command (FORSCOM) have established as a goal that units should train to operate continuously in a chemical environment for 4 to 6 hours.

In addition to training, the need to refine NBC decontamination procedures has been recognized. Current doctrine and procedures for the decontamination of aircraft are contained in the following publications:

• FM 3-5 (Coordination Draft), "Nuclear, Biological, and Chemical (NBC) Decontamination."

• FM 21-40, "Nuclear, Biological, and Chemical (NBC) Defense."

• TM 3-220, "Chemical, Biological, and Radiological (CBR) Decontamination."

Improved procedures will be forthcoming in both FM 1-2, "Aircraft Battlefield Countermeasures and Survivability (ABCS)," and FM 3-5, mentioned above. Estimated fielding dates are 1982 and 1984, respectively.

The decontamination problem facing the aviation community is that the alkyd and acrylic lacquer paints currently used on vehicles and aircraft soak up chemical agents, only to release them later and produce a chemical vapor and contact hazard. The only current decontaminant that removes agents from alkyd or acrylic lacquer paint is DS 2, which is corrosive to aircraft and aircraft components. Therefore, the only two currently recognized procedures for decontaminating an aircraft are:

• Cleaning the aircraft with soap and water or cleaning solvent which may remove surface contamination but will not remove agents from the paint.

• Weathering, which will allow the agent to evaporate and diffuse from the paint naturally. Flying the aircraft is a type of accelerated weathering.

There is no current equipment which will indicate successful decontamination; however, the Chemical Systems Laboratory, Aberdeen Proving Ground, MD, and the Chemical School are working on two solutions to this problem. The first is a product improvement program for the M8 Chemical Agent Alarm to provide it a sniffer hose, to be fielded in the near future. The second is an effort to develop a contamination monitor, possibly based on ion detection principles. Estimated fielding date for this second effort is in the 1987 timeframe.

Additional developmental efforts are underway to improve our individual protective equipment. Some significant near-term items are listed below:

• The chemical protective overgarment is being "flame-hardened" by Natick Research and Development Laboratories, Natick, MA, under a product improvement program. The improved overgarment will incorporate a Nomex outer fabric laminated to an activated carbon foam/cotton lining treated for fire retardancy. Type classification and availability to the field is expected by fiscal year 1983.

• Chemical Systems Laboratory is developing the XM33 protective mask which is expected to be fielded by November 1982. It will provide an improved interface with optical sights, aircrew flight helmets and avionics, and will minimize distortion/depth perception problems by means of a variable thickness lens.

• Natick Labs are also attacking the problem of heat stress by investigating individual microclimatic crewmember cooling. This may be a liquid-cooled vest designed to alleviate heat stress and will be worn under other garments.

The Aviation Center has initiated a long-term effort to develop an Aircrew Life Support System, Integrated Battlefield (ALSSIB). It will incorporate into one aviator life support system all the essential characteristics currently found in individual NBC protective equipment and aviation life support equipment and, in addition, will incorporate various other modern technology such as heads-up weapons displays. This effort is necessarily complicated, but the complexity of our aircraft in the environment on the integrated battlefield demands it. Until this equipment is fielded, our goal must continue to be to train with the current ensemble and attempt to achieve the same level of flying proficiency with it that we would attain without the chemical protective clothing and equipment.

The integrated battlefield provides the aircrewmember with the most challenging environment we have faced in Army Aviation's history. Only with the utmost concern, dedication and professionalism will we be able to train to the optimum level with current equipment. However, we *must* if we truly expect Army Aviation to be an effective member of the combined arms team on the integrated battlefield.

HITCHHIKING WITH

Major Robert B. Robeson
and
Major Gerald L. Anderson
Nebraska Army National Guard
Lincoln, NE

Loading the first Huey onto the cavernous cargo deck of the C-141A in Lincoln, NE

photographs by Major Gerald L. Anderson

ANNUAL SUMMER training for Army National Guard (ARNG) aviation units can often become routine without periodic changes of pace. Last year, thanks to the initiative of the Nebraska aviation safety officer, the 24th Medical Air Ambulance Company in Lincoln tried something that had never been attempted before in this state.

The idea originally occurred to Major Jerry Anderson, aviation safety officer, when he received a letter from 6th Army giving specific instructions on how to request joint airborne/air transportability training (JA/ATT) from the U.S. Air Force.

The Air Force had agreed to fund this program for the specific mission of providing realistic interservice combat airlift training. It would provide aircraft, crews, fuel and all the necessary equipment to enable U.S. Army units (Active and Reserve) to conduct a variety of training missions that would run the gamut from flare support illumination (C-130) for close air support and artillery firing to loading exercises and air delivery of supplies and equipment, naming only a few of the possibilities.

Major Anderson knew that the 24th Medical Company was scheduled to attend annual training (AT) in May 1981 at Camp Roberts, CA, where they would be participants in a medical ARTEP (Army Training and Evaluation Program) validation for U.S. Army Forces Command (FORSCOM) in a joint exercise with other National Guard, Reserve and Regular Army units (about 3,500 personnel altogether).

Knowing this, he felt that experience was needed by unit maintenance personnel in loading and unloading unit helicopters from U.S. Air Force Military Airlift Command (MAC) C-141s, in case some of the unit's 25 helicopters might have to be

HUEYS

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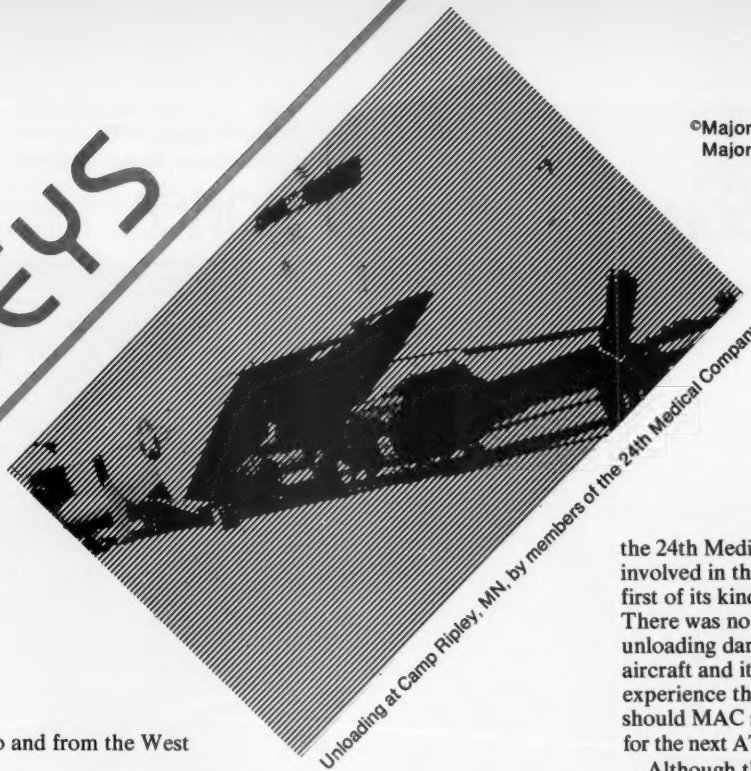
Major G. L. Anderson, 1981



Unloading at Camp Ripley, MN, by members of the 24th Medical Company

ferried to and from the West Coast.

As usual, paperwork involved in such an undertaking is the most time-consuming of all. It required 90 days of leadtime to 6th Army by way of the Nebraska ARNG G-3 section, with an info copy to Readiness Region VIII. The requests were consolidated at 6th Army and forwarded through FORSCOM to MAC headquarters. An aircraft was then allocated to the mission by MAC during its monthly JA/ATT conference.

Two UH-1H Huey helicopters were prepared for loading at the Lincoln Municipal Airport on 26 July 1980 for their trip to Camp Ripley, MN by way of Minneapolis-St. Paul International Airport.

Sergeant First Class Leroy Trease, 24th Medical Company Maintenance Platoon sergeant, was in charge of the loading exercise on both ends of the operation. He supervised the removal of the tail rotors, main rotor blades, heads, masts, sync elevators and antennas. Eight maintenance people worked about 7 to 8 hours readying the aircraft.

On the morning of Sunday, 27 July, aircraft No. 60192—a C-141A from the 62d Military Airlift Wing of MAC—landed in Lincoln as scheduled. It required almost 3 hours to load both Hueys, about one-half of the time the loadmaster had stated it should take.

Then the C-141 flew the 300-odd miles directly to the Minneapolis-St. Paul International Airport, accompanied by 24th Medical Company maintenance personnel. There it was unloaded in about 1½ hours.

After the aircraft were put back together and test flights accomplished, they were flown 90 miles to Camp Ripley on 28 July. All in all, nine maintenance personnel and four pilots from the 24th Medical Company were involved in this undertaking, the first of its kind in Nebraska. There was no loading or unloading damage to either aircraft and it was a good learning experience that will be useful should MAC support be required for the next AT period in California.

Although this type of joint-service training support is not quite as free and available as sand in the Sahara, there are opportunities inherent in such an undertaking for those who have both initiative and patience. What was important in this occurrence of hitchhiking with Hueys is the fact that a plan must be formulated and practiced as to how a unit will handle this particular situation *before* it should ever be necessary.

In the case of the 24th Medical Company, the time and effort expended on this project were well worth the trouble. There is no doubt that it added variety to their AT activities. And it should be a subject of lively conversation in the long winter months ahead when hangar rash—a psychological phenomenon unique to aviation personnel when they're not able to fly long cross-country flights—makes its predictable appearance around January when snow, as usual, is up to the tail rotors in Lincoln.

Lieutenant Colonel David M. Lam, M.D.
Commander, MEDDAC Medical Department Activity, Fort Irwin, CA

FROM BALLOON TO BLACK HAWK

The Army Forward Aeromedical Evacuation Story

PART III: KOREA

ON 25 JUNE 1950, North Korean troops, spearheaded by tanks, spilled across the 38th Parallel and invaded the Republic of Korea. As the invaders raced toward Seoul, the South Korean capital, the United States responded to a United Nations' request to assist the South Korean Army. On 30 June, U.S. ground forces entered the war.

Probably the first unit to respond to requests for air evacuation was the Air Force's 3d Air Rescue Squadron (ARS), which was based in Japan. Reacting to numerous requests for assistance, the squadron sent two L-5Bs to Korea on 7 July 1950, only to discover that the fixed wing aircraft were not able to function adequately on the Korean battlefields, which seemed to consist entirely of mountains and rice paddies. On 22 July, several H-5s (figure 1) of the 3d ARS, equipped with external litter pods, arrived in Taegu, Korea, and immediately began aeromedical evacuation of casualties from the front. Meeting with immediate success and acceptance, the squadron deployed 6 of its 9 H-5s to Korea by the end of August; by this time the unit had evacuated 83 Soldiers.

A demonstration of the capabilities of these helicopters, nearly twice as powerful as the YR-4s of World War II, took place before a combined Army and Air Force staff in the schoolyard of the Taegu Teacher's College on 3 August 1950, and led to the development of the first organized procedures for evacuation. On 14 August, General George E. Stratemeyer, commander of the Far East Air Force, requested 25 H-5s to be used strictly for medevac duty. He received 14.

Soon thereafter, the Surgeon General of the Army requested the Department of the Army send 50 helicopters to Korea for medical

evacuation purposes, and the Navy Surgeon General's Office recommended that helicopter landing pads be constructed on the fantails of all hospital ships. With the arrival of the extra H-5s requested by General Stratemeyer, the forward base of the 3d ARS in Taegu was reorganized as Detachment F of the 3d ARS on 24 September 1950.

With the ebb and flow of the war, the harsh terrain of Korea made the helicopter nearly indispensable. Even when ground units were not surrounded by the enemy, road transport was often impossible, and the ebb of battle from Pusan and Inchon to the 38th Parallel and back again often left small units isolated without contact by ground to other Allied forces. Air evacuation was the only alternative. Marine HO3S-1 helicopters (the same aircraft as the Army and Air Force H-5) first entered the war as combat evacuation vehicles on 4 August 1950 during the battle at Chindongni. These helicopters, unlike the Air Force H-5s of the 3d ARS, were not rescue aircraft but observation machines, and they therefore were not equipped for casualty evacuation. Battlefield modifications were made; windows were removed and litter platforms were constructed. The jury-rigged system worked well, even though the patient's feet had to stick out a foot and a half beyond the window.

On 11 November, Marine helicopters airlifted 950 troops to the front and retrieved almost as many wounded. On 22 November the Army's demand for Army helicopter evacuation units began to be met when the 2d Helicopter Detachment, equipped with four H-13 Sioux observation helicopters (figure 2), arrived in Korea. From arrival until the end of December, the unit trained to familiarize itself with the aircraft capabilities and the terrain, and on 1 January the detachment became operational and was attached to the 8055th Mobile Army Surgical Hospital (MASH). From this time on, the Army assumed the dominant role in medevac in Korea.

FIGURE 1: H-5 helicopter, 1952

Two more Army helicopter units, the 3d and the 4th Helicopter Detachments, each with four H-13 aircraft, arrived in January 1951, and were attached directly to Army MASH hospitals. The 1st Detachment arrived in February, but lost all its aircraft to other units and never became operational. The H-13s used by these units again demonstrated the improvisation which was necessitated by our lack of preparedness for this war. Being small observation aircraft, they could not carry patients inside the fuselage and were not equipped with external litter pods. The pilots obtained Stokes litters from a Navy hospital ship and mounted them externally on the aircraft to allow patient transport. Later, the H-23A Raven helicopter (figure 3) entered the theatre to supplement the H-13s. It had been modified by the manufacturer to allow the use of the standard Army litter on external litter racks.

During the first 6 months of 1951, these three detachments evacuated 1,985 patients. In May 1951, these detachments were redesignated and reorganized, incorporating the aircraft and personnel of the never-operable 1st Detachment. Fighting problems of fuel shortage and lack of spare parts—as well as the enemy, the weather and the terrain—in their first full year of operation these units evacuated 5,040 casualties.

In addition to dealing with the technical problems they faced, the helicopter crews had one other major obstacle to overcome—education. The helicopter was a new machine, and few line troops or officers had any experience with it. They tended to have certain misconceptions about the capabilities of helicopters which, in the early days of the war, resulted in times when the aircraft were unable to respond as desired to calls for help. Requests for evacuation were made by units ignorant of the fact that these early H-13s had no night flying capability. Troops did not realize that because of an inability to fly at great heights and because they were unarmored, the H-13s were vulnerable targets for ground fire. Most important, it was widely believed that a helicopter could land anywhere.

Eighth Army Information Bulletin number 19 was issued on 23 June 1951, entitled Standard Operating Procedures for Helicopter Evacuation. The information contained, along with continuing educational efforts by the aviation units, led to

greater use and less abuse of the system.

The aircrews of the Air Force's 3d ARS Detachment F also were having problems. Although their H-5 helicopters were better equipped for evacuation than the Army's H-13s and H-23s, they were of a type no longer in production. Accordingly (although the unarmored craft was surprisingly resistant to ground fire), each one shot down was increasingly difficult to replace or repair—and spare parts became nearly impossible to find. Thus, it was much appreciated when an Air Proving Ground Test Team brought two YH-19 Chickasaws (figures 4 and 5) to Korea in March 1951 for testing under combat conditions. The tests were very favorable, and in February 1952, H-19s began replacing the aged H-5s.

Even while the war was raging in Korea, the military began to draw on the Korean experience to further develop a true aeromedical evacuation system. In August 1951, Army-Air Force Joint Exercise "Southern Pine" took place in North Carolina, and incorporated air evacuation as a part of the game play. In planning, the services could not agree as to whose responsibility it was to provide air evacuation. The Air Force contended that all air evacuation, forward as well as theatre and srategic, was an Air Force responsibility while the Army claimed responsibility for evacuation from within the field army area. It was agreed that both systems would be used in the exercise, with each service supporting about the same number of troops. The Air Force's provisional helicopter transport squadron thus was placed in direct competition with the Army's recently formed 6th Transportation Helicopter Company.

Both organizations proved adequate to the task, although the Army evacuation system was found to be sorely hampered by the requirement that casualties be processed through each echelon of the traditional evacuation system, while the Air Force allowed bypassing of unnecessary stops. This exercise resulted in two major conclusions from the Army point of view. First, it was determined that the Air Force evacuation policy of bypassing intermediate echelons of care when possible was desirable. Second, it was determined that optimum use of forward evacuation aircraft would be improved through organization in a detachment rather than in the larger company organizations favored by transport helicopter companies.

FIGURE 2: H-13 Sioux in Korea, the "Angel of Mercy"

As a result of the increasing Army role in air evacuation in Korea, and in spite of the excellent showing made by the Air Force in exercise "Southern Pine," the Secretaries of the Army and the Air Force met in October 1951, and issued a joint memorandum of understanding, further clarifying the Air Force and the Army roles in forward air evacuation. A month later, the Vice Chief of Staff of the Air Force issued a memorandum of interpretation of this joint memorandum which included the comment that ". . . the

FIGURE 4: H-19 Chickasaws of the 6th Transportation Helicopter Company in Korea

FIGURE 3: H-23 Raven

Air Force agrees to the inclusion of the function of battlefield aerial evacuation of Army personnel in the mission of Army organic aircraft and is prepared to waive responsibility for aerial evacuation of casualties from forward areas of the battlefield to appropriate medical units within the division area."

Finally, the lines of responsibility had been clearly delineated; the Air Force voluntarily surrendered its forward air evacuation function, as assigned in the 7 September 1949 directive. The Army could, and did, generate more aircraft requirements to carry out this function.

Based on both its early experiences in Korea and in exercise "Southern Pine," the Army decided that helicopter ambulance units should be a small cellular detachment, which would be attached directly to forward medical or line units for support, rather than the fully self-sufficient company decided upon for the transportation helicopter elements. Therefore, the Department of the Army adopted TOE 8-500R, Helicopter Ambulance Unit, in August 1952, which consisted of five helicopters, seven pilots and necessary support personnel. On 15 October 1952, the 53d Medical Detachment (Helicopter Ambulance) under this TOE was activated at Brooke Army Medical Center, Ft. Sam Houston, TX, which had been designated as the training site for all future Army medical helicopter units.

Not all of the medical evacuation performed by the Army in Korea was done in Medical Department helicopters. Light aircraft and heli-

copters organic to various line units were used extensively in evacuation, particularly in the early days of the war before organized medical air evacuation became available. In addition, H-19 helicopters of the two Transportation Corps helicopter (cargo) companies, the 6th and the 13th, proved extremely useful later in the war in the mass evacuation of casualties, moving more than 2,200 patients in the last 5 months of the war. Even after the nearly complete takeover of the forward air evacuation mission by the Army, the Air Force Air Rescue Service squadrons continued to perform special rescue/evacuation missions as requested by the Eighth Army.

One of the organizational problems that became apparent as more and more patients needed evacuation was that there needed to be direct medical regulating control over air evacuation. Both to avoid over-evacuation and to ensure adequate evacuation coverage, medical regulating staff agencies were established by division and corps surgeons, and the medical helicopter units were placed under the operational control of the MASH they supported. On 2 December 1952, the three helicopter ambulance detachments were reorganized under TOE 8-500, and became the 49th, 50th and 52d Medical Detachments (Helicopter Ambulance). For the first time, the helicopter ambulances had become medical rather than line units. They were henceforth under the administrative as well as the operational control of the Eighth Army Surgeon, fulfilling a long-sought goal of the Army Medical Service.

It was also decided at this time that all future medical evacuation pilots should be members of the Army Medical Department rather than line officers, and they should be trained to render lifesaving treatment before or during evacuation. However, due to personnel selection and training, the first Medical Service Corps pilots were not to arrive in Korea until 1 month after the end of hostilities.

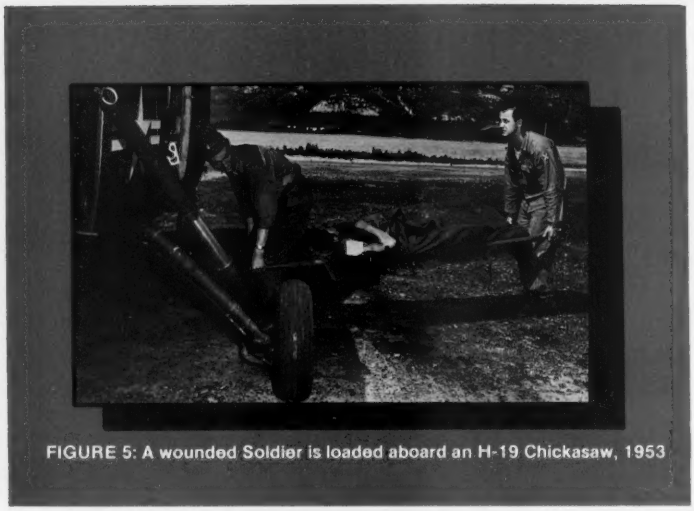


FIGURE 5: A wounded Soldier is loaded aboard an H-19 Chickasaw, 1953

In spite of the recommendations made after exercise "Southern Pine," it became evident that many of the early problems faced by the helicopter ambulance units had been due to a lack of centralized organizational control with consequent unnecessary duplication of effort. Therefore, on 3 February 1953, the First Helicopter Ambulance Company (Provisional) was organized, consisting of the three medevac detachments already in country plus the 37th Medical Detachment (HA), which had recently been organized. This company organization gave the four units better control of operations, administration and logistics. Even though the unit was only in combat for the last 5 months of the war, the advantages of the company rather than the detachment organization became manifest. This provisional unit was retained after the end of the war and served as the prototype for today's air ambulance company.

Unlike forward air evacuation in World War II, the achievements and potential of air evacuation in Korea could not be ignored after the war. Between 1 January 1951 and the armistice on 27 July 1953, Army helicopter ambulance detachments under Medical Service control evacuated 21,212 casualties, Air Force helicopters evacuated more than 8,500, and Navy and Marine helicopters and organic Army Aviation assets evacuated many more. Although combat operations of course ceased with the cessation of active hostilities, the forward evacuation system was not "mothballed," as had been the liaison airlift of World War II. The terrain features which had made air evacuation a necessity in Korea during the conflict continued to require the use of helicopter evacuation for sick and injured personnel who remained in Korea. Both medical and transportation helicopter units were used extensively during the various prisoner of war exchanges and proved extremely valuable in the movement of patients between Korean medical facilities and Navy hospital ships offshore.

Editor's note: For more about Army forward aeromedical evacuation see "The Army Aviation Story, Parts VIII and IX," January and February 1963 ***Aviation Digests.*** Next month this series concludes with Part IV, Vietnam.

U.S. Army Communications Command
ATC ACTION LINE

ATC SYSTEM COMPONENT BREAKDOWN

LISTEN ATC, I'll fly my airplane and you fly your desk!"

This is the way it should be; however, when the going gets "hairy" it changes to: "Didn't you see that other aircraft we just missed?"

In a very broad sense the ultimate capabilities of today's ATC system in preventing midair collisions can be boiled down to two categories of human actions involving prescribed roles, duties and responsibilities. These categories of actions are controller intervention and aviator evasive action. In a radar environment they are meshed into an overlapping shield of protection against midair conflicts.

Since the ATC system is both operated and used by human beings, it is always vulnerable to human error. Add to this the limitations placed upon the system by equipment malfunctions, saturation and miscoordination and we might conclude that flying is a dangerous business. When just *one* of the above improper actions occurs, flying at that particular location *does* become extremely dangerous.

The following slightly edited description of an actual event serves as a good example of what can happen when just one element of the system breaks down:

Home Airport flight visibility was about 4 to 5 miles in the haze with the haze top at 4,500 and clear above. Home Airport is within a TRSA (terminal radar service area) and its ILS (instrument landing system) runway 7 approach passes directly above the Plate Airport where the outer marker (OM) is located. Aircraft "A" was on an IFR (instrument flight rules) flight plan on the ILS approach into Home just outside the OM about 6.5 nautical miles from the runway 7 threshold, descending on the glide slope at about 2,900 feet MSL (mean sea level), in landing configuration with gear and flaps down and anticollision and landing lights on. Aircraft "B" was first seen in the middle of the right side of the windshield, heading northeast at the same or slightly lower altitude and at a distance of about 150 feet. Aircraft "A" immediately and violently dove to avoid a collision. The other aircraft passed above and in front of Aircraft "A" missing by about 25 to 40 feet. No action by the pilot of Aircraft "B" was ever observed. All unsecured articles in reporter's aircraft were thrown about the cabin; no injuries took place. When descent was stabilized, climb power was applied and left climbing turn instituted off Home localizer after informing Home approach of the incident.

After uneventful landing and a change of clothes, the pilot of Aircraft "A" had conversation with Home tower and approach personnel and was told that at no time did radar operators ever see the other aircraft, before or after the near-miss. Home ATC also informed him that neither they nor Plate tower had ever been in contact with the other aircraft, which was crossing the localizer near the outer marker at exactly the glide slope intercept altitude within the Home TRSA and within the Plate Airport traffic area. Aircraft "B" should have been detected on radar. He should not have been in Plate's airport traffic area unless he was landing there or had permission to enter.

In this instance, the controller intervention factor broke down. If both controller intervention *and* aviator vigilance had been absent, good luck—which apparently wasn't there either—would have become the deciding factor in this life or death situation. As statistics indicate, sometimes "Big Brother" does not see nor hear.

Simply stated, the aviator must fly with a constant alertness as if his life depends upon it—IT DOES!

Readers are encouraged to address matters concerning air traffic control to:
Director, USAATCA Aeronautical Services Office, Cameron Station, Alexandria, VA 22314

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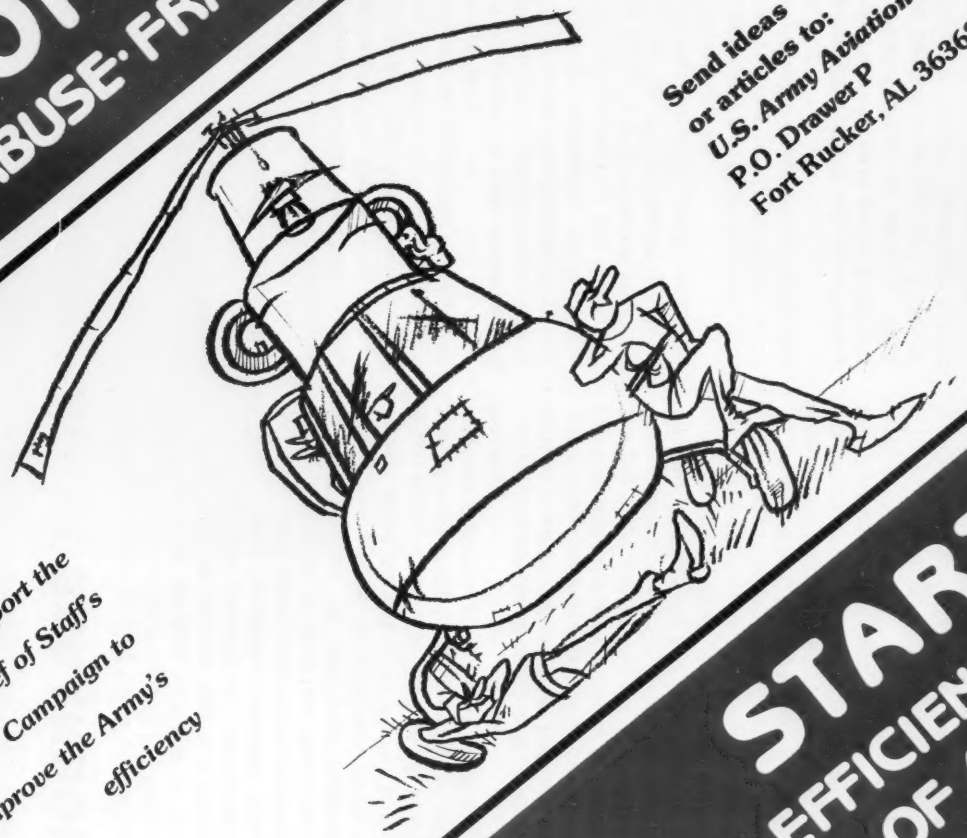

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